DOCUMENT RESUME

ED 123 419 CE 007 157

TITLE Allied Health Field, Ninth Grade. Introduction to Allied Health and the Health Care Team. Operation TACT [Toward an Allied Health Career Today] Curriculum [and Teachers' Handbook].

INSTITUTION Connecticut Univ., Storrs. School of Allied Health Professions.

PUB DATE 74

NOTE 172p.; For the other curriculum guides, see CE 007 155-159; For the report of the project, see CE 007 160

EDRS PRICE MF-$0.83 HC-$8.69 Plus Postage.

DESCRIPTORS *Curriculum Guides; Educational Objectives; Grade 9; *Health Occupations Education; *Learning Activities; *Science Education; Secondary Education; Study Guides; *Teaching Guides

IDENTIFIERS *Operation TACT; TACT; Toward an Allied Health Career Today

ABSTRACT

The two-part set consists of a student handbook and a related teachers' handbook in allied health education for use at the ninth grade level. The student handbook contains nine units which focus on the science curriculum: (1) introduction, (2) weights and measures, (3) human body, (4) chemistry, (5) electricity and magnetism, (6) heat and its effects, (7) fluid dynamics, (8) wave motion and sound, and (9) light. Each unit presents a general introduction to the subject area, objectives, vocabulary words to be defined, related professions, and learning activities and exercises for acquiring skills and understanding concepts related to a particular health field. The teachers' handbook consists of two parts: a brief teaching guide to the above units and a curriculum guide outline for a course applying scientific information to allied health professions. The curriculum lists the objectives of the course and suggests speakers from different professions. A study outline of the course based on the nine units is presented briefly. Also included in the teachers' guide are suggested resources; a description of films, filmstrips, and printed materials; a list of films and their suppliers; and suggested laboratory studies. (EC)

***********************************************************************
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
***********************************************************************

ED123419

# ALLIED HEALTH FIELD

NINTH GRADE

Introduction to Allied Health and the Health Care Team

Operation TACT
Curriculum

CE007157

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY

Polly A. Fitz

TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER."

# NINTH GRADE - CURRICULUM OUTLINES

# UNIT I

# INTRODUCTION

# INTRODUCTION

## OVERVIEW

Your teacher will discuss with you the basic foundations of this course and what he expects to cover. With each unit you will be given a supplement that introduces you to the related allied health fields you will also be studying. You will be expected to keep a scrapbook on health careers that appear in newspapers or magazines that you read. If there are any careers you are interested in, feel free to ask your teacher for information. The following material will introduce you to the health field and the opportunities available to you for employment.

# INTRODUCTION

In this unit you will be introduced to the procedure you should follow in any scientific investigation. The experiments are designed to guide you to understand and apply the scientific principles you have mastered. You will then study the many allied health career opportunities available in your community and its surrounding area. You will be required to bring in the classified section of your Sunday newspaper and list all the jobs that are related to the allied health field. Also, you will study some basic requirements for these jobs.

# INTRODUCTION

## OBJECTIVES:

1. The student will be able to identify the three major subdivisions of science and several of the specialized Allied Health Fields within them.
2. The student will be able to use the scientific method and set up a simple experiment.
3. The students will be able to describe seven (7) job opportunities available to them in the Allied Health Field.

## VOCABULARY

1. Allied Health
2. Scientific Method
3. Observation
4. Sequence
5. Biology
6. Chemistry
7. Physics
8. Experimental Group
9. Control Group
10. Hypothesis
11. Theory
12. Conclusion

# INTRODUCTORY QUESTIONS

1) What is science?

2) What are the three major fields of study in science?

   a.

   b.

   c.

3) What is the scientific method of investigation?

4) How do you use the scientific method every day?

5) What is an allied health career?

6) Who can enter the allied health field?

7) How does the study of science apply to the allied health field?

# BRAINSTORMING

The teacher should elicit questions and answers from the students during this class period. The first topic is "What is Science?" All the students have had science before this, but how do they define it? Next in science "What are the three major fields that science is divided into?"

1. What is Science?

2. What are the three major fields that science is divided into?

# ACTIVITIES (A)

How do you use the Scientific Method every day?

When someone offers you something, how do you know to accept or reject it? In the following activity you will be put in that situation. Write down all the thoughts you have and what data you used to make your decision. When you are finished, your teacher will discuss with you the way scientists use their power of reasoning to help them.

Do you know how many medically-related jobs are available to you in your community? In this activity you will research this question and find out something about the requirements to enter these fields. Also, answer the following question: What are the requirements needed to qualify for these jobs?

# ACTIVITIES (B)

1. List the job opportunities available at a hospital.

2. Use the classified section of your Sunday newspaper and make a list of all the medically-related jobs.

3. What are your basic conclusions about the job market for medical personnel in your area? For the United States?

# UNIT II

# WEIGHTS AND MEASURES

# METRIC SYSTEM

## INTRODUCTION

Man has always had a need for measuring things. In order to communicate the weight, length, and space an object occupies, a uniform system of measurement was needed. Otherwise, these relationships could not be uniformly understood which would, of course, cause great confusion. Today we have the English System and the Metric System of measurement. In this unit we will look at both systems and study their importance and use in the medical field and everyday life.

## METRIC SYSTEM

## OBJECTIVES

1. The student will be able to discuss the importance of the metric system to the medical field and its professions.
2. A student will be able to use a balance correctly.
3. A student will be able to use a metric rule to measure distance.
4. A student will be able to measure the volume of an irregular object by the process of displacement.
5. A student will be able to construct a data sheet, make and use a graph.
6. A student will be able to read a graduated cylinder correctly.
7. The student will be able to convert from the Metric System to the English System and back.
8. The student will know some of the history behind the establishment of the English and Metric Systems.

## METRIC SYSTEM

## VOCABULARY

Throughout this unit you will brainstorm with your teacher to develop a definition for the following words. You may use your notes from class or your laboratories to help you. Make sure that the definitions are short and you understand just what they mean. Then use each word in a sentence correctly. At the end of the unit you will be tested on the meaning and usage of each of these words.

1. Kilo

2. Centi

3. Milli

4. Gram

5. Liter

6. Meter

7. Mass

8. Density

9. Volume

10. Specific Gravity

11. Graduated Cylinder

12. Balance

## METRIC SYSTEM

## QUESTIONS

1. What are the characteristics of a standard system of measurement?

2. Why is the English System not a convenient system of measurement?

3. Why is the Metric System used in scientific work?

# METRIC SYSTEM - $100 BILLION CONVERSION

--taken from The Hartford Times, Sunday, January 27, 1974,
--written by John Levesque, Staff Reporter

Remember that high school chemistry class where you had to change pounds to grams, feet to meters and quarts to liters? If you'd lived in Paris, all those conversions would have been unnecessary - and quite foolish.

In a few years, though, such conversions will be a waste of time here in the United States, as well. In fact, some of the country's largest corporations - General Motors and IBM to name a couple - have switched or are in the process of converting all their measurements to the metric system.

Local industry, however, is procedding a bit more deliberately and merely "staying on top of the matter," in the words of a United Aircraft Corp. spokesman.

"The metric system in the U.S. is still 10 years away," said one observer, basing his assumption on proposals now before Congress. "It's premature to talk about conversion."

Not so, says Allan M. Nelson, who is chief metrologist in the Weights and Measures division of the state Department of Consumer Protection.

Nelson acknowledged that total switchover probably will be accomplished over a span of a decade, but he insisted it's not too early to talk about it.

"If we're requested to give any talks," Nelson noted, "we usually try to discuss the metric system. We have to make the public aware that it's coming."

Just when the system arrives, of course, is still uncertain. Bills have been kicked around in Congress for more than a decade with little success, but many experts think the time is right for the big switch.

One measure introduced in the Senate recommends the popular 10-year "voluntary" conversion to metrics, and the establishment of a 25-member Government Metric Conversion Board to keep the confusion to a minimum. A number of legislators see a good chance for its passage this year.

Whatever the case, Nelson predicts a switchover will begin soon.

"It may get to the point," he suggested, "where the country just won't wait for legislation."

He cited reports that U.S. exporters are having more and more difficulty competing in foreign markets. Metric dimensions are common the world over, Nelson explained, while only the U.S. and a handful of smaller nations continue measuring things in inches, pounds, gallons and bushels.

Even Great Britain and Canada, two countries that once used the so-called English or Imperial system, are changing over. The

U.S. is the last major power to consider switching to metrics. Primary reasons for America's reluctance are stubborn traditionalism and fiscal conservation.

Estimates concerning a total national conversion from the English system to the metric system go as high a $100 billion. No estimates have been made concerning what it will cost Connecticut industry, but it no doubt will be substantial.

"There had been talk of providing tax breaks," Nelson noted, "but now it appears industry will have to bear the brunt of it all."

According to the monthly publication of the New York Stock Exchange, however, companies that already have instituted metrification plans "have found the cost reasonable when compared with the sales opportunities and profit potential of going to the metric system."

The metric system is based on natural standards, whereas the English system was devised rather arbitrarily. Three basic units of the metric system are the meter (for measuring length), the gram (for weight) and the liter (volume).

A meter - 39.37 inches - was calculated to be 1/10,000,000th of the distance between the equator and the North Pole. The gram-.035 ounce - is the weight of one cubic centimeter of water, and the liter - 1.056 quarts - is the volume of one kilogram of water.

The inch, meanwhile, was determined ages ago by placing three barleycorns side by side. The foot was the length, obviously, of the English king at the time. The yard was either the length of a sash around the waist of early Saxon kings, or the distance between King Henry I's nose and thumb when his arm was outstretched.

The United States, a leader in technology for centuries, has stuck with that rather arbitrary system. Many feel a change to something a little more logical is long overdue.

That feeling is shared locally by several individuals and companies.

"I welcome the change," Allan Nelson said, "even though it's going to cause some confusion."

The metrologist explained that schoolchildren will absorb the basics of the metric system very quickly. Older persons, he said, will have problems.

Because of that, at least two companies in the area - the Stanley Works in New Britain and Kaman Aerospace in Bloomfield - have begun educational programs for employees and the general public.

In addition, the State Board of Education last November approved a program that will teach 2,600 elementary school teachers about the imminent conversion to the metric system. The program is to be financed by a $21,876 grant from the National Science Foundation.

Eventually, proponents hope, all of Connecticut will be able to know the distance from Hartford to New Haven in kilometers. In the meantime, most of the state apparently will wait for Congress to act, despite Nelson's beliefs to the contrary.

As the spokesman for United Aircraft said, "We have to wait for some standards before we switch. Until then, we'll keep an eye on it."

Questions:

1. Why is it important for the United States to convert to the metric system?

2. What has been the reaction of some companies to the conversion to the metric system?

3. What everyday problems can you foresee that you might have as a result of the standard use of the metric system?

# METRIC SYSTEM

## ACTIVITIES

The following experiments will acquaint you with the use of the metric system and why it is used in scientific work. When you finish these experiments, you will then study where the metric system applies to the medical field and who uses it.

## THE HAND

NAME________________________

**Purpose:** To become familiar with the use of the metric system and show variations in the human body.

**Materials:** Metric rule, 1000 ml beaker, Balance, and 100 ml graduated cylinder.

**Procedure:**

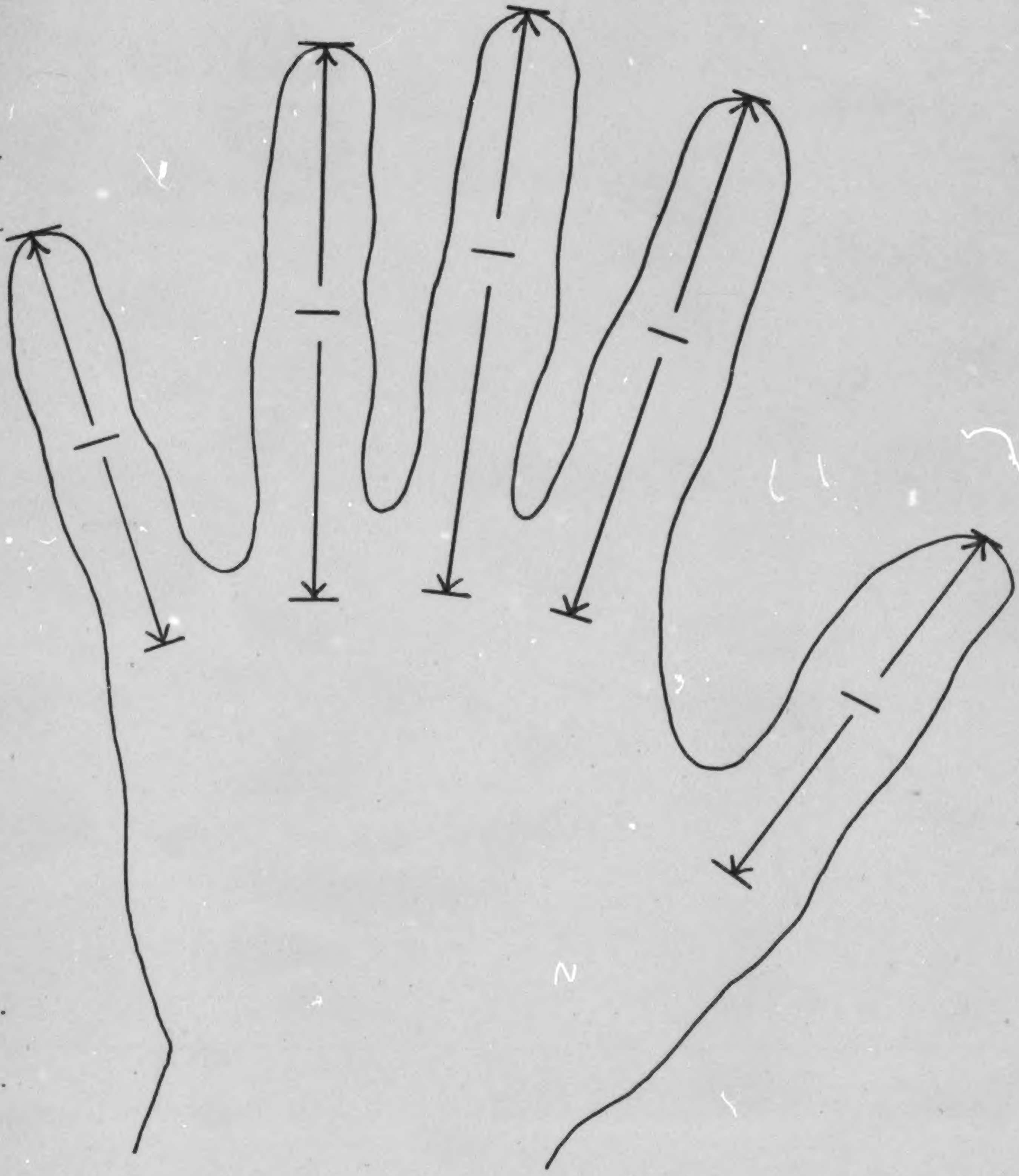
1. Measure the length of each of your fingers and thumb from the base to the tip. Record your results on diagram 1.
2. Measure the length of each bone in your fingers and thumb by bending each joint and measure from the edge of one joint to the next. Record your results in diagram 2.
3. Weigh the 1000 ml beaker and record this.
4. Close your hand slightly and place it in the beaker. Fill the beaker to the 1000 ml mark. Make sure that your hand is in the water only to the wrist.
5. Remove your hand, and figure out the volume of water left, and subtract this from 1000 ml to get the approximate volume of your hand.
6. Since your body is made up of about 80% water, how much of the total volume of your hand is water?
7. Find out the average for the class for all parts of the hand.

**Questions:** What limits are there in your accuracy in determining the above measurements?

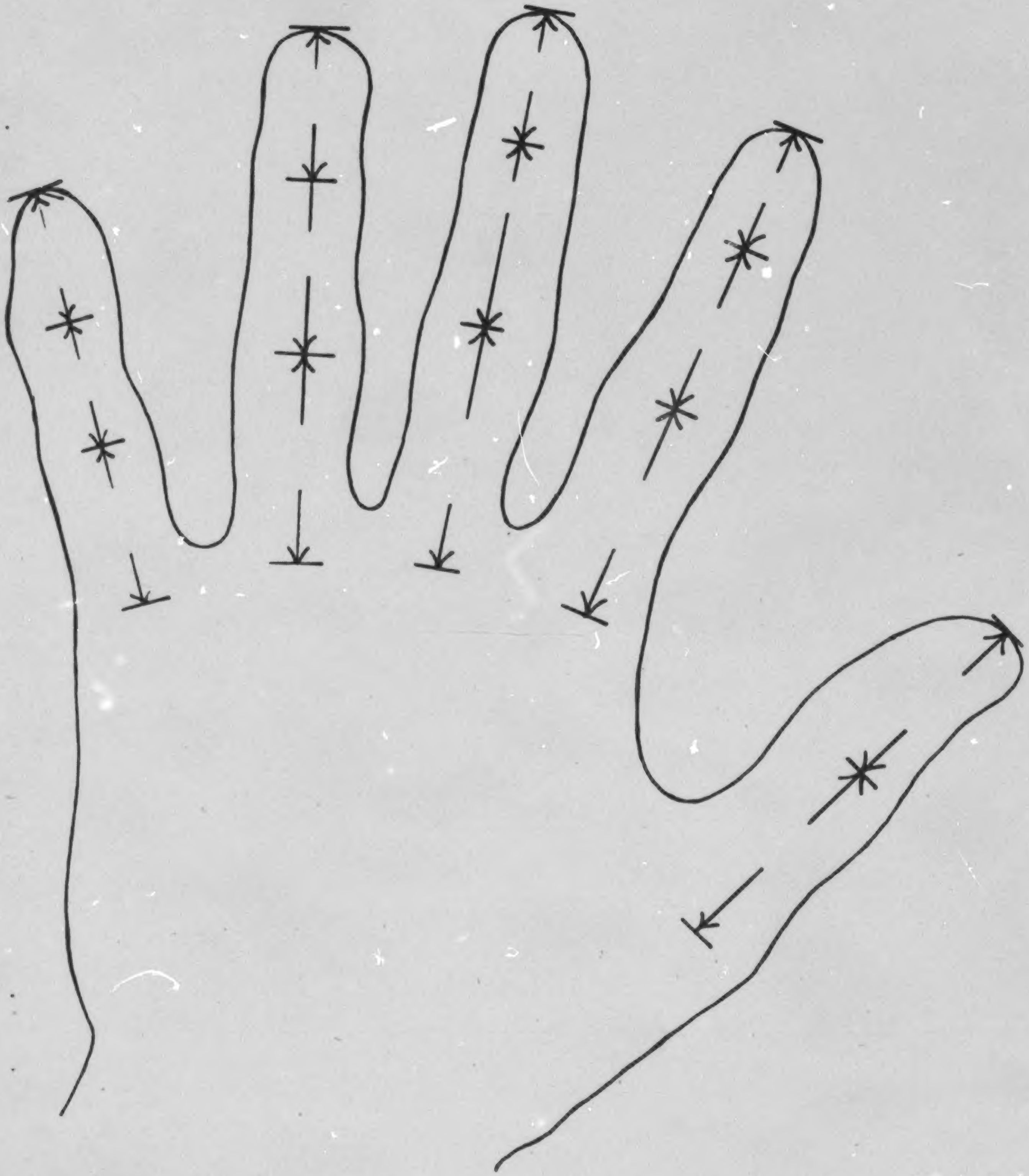
What are some advantages of the metric system?

How could we be more accurate in our measurements?

1



2



## CHARTS

Weight of 1000 ml beaker with water in it ____________________

Weight of 1000 ml beaker empty ____________________

Weight of water in beaker ____________________

Volume of water in beaker ____________________

(Volume of hand) __________ x .80 __________

Approximate volume of water in hand ____________________

## METRIC UNITS

In this laboratory you will study the units of measurement of the metric system as compared to the English units.

Purpose: To become familiar with the use of the metric system.

Materials:
Meter stick
Ruler
Graduated cylinder 10 ml, 100 ml
Quart bottle
Pint bottle
Cup liquid
1 oz. glass
balance
1 pound weight
1 oz. weight
1 kilogram weight
1 set of weights

Procedure:

1. Obtain a meter stick and examine its divisions. How many major divisions is the meter stick divided into? (0-10, 10-20, etc.) What is this unit called? Now examine a yard stick as above. Note (major divisions 0-12, 12-24, 24-36).

2. Measure your desk top to the nearest millimeter. Note: Do not use the first or last divisions of the meter stick. Why? Then use a ruler to measure the desk top. Fill in Chart A.

   Repeat each measurement 3 times; then average them and complete the chart.

3. Compare the divisions on a meter stick with those on a ruler. Complete chart B.

## CHART A

### Desk Top

| | Metric | English |
|---|---|---|
| Length: | Trial 1 | 1 |
| | Trial 2 | 2 |
| | Trial 3 | 3 |
| | Total | |
| | Average | |

| | Metric | English |
|---|---|---|
| Width: | Trial 1 | 1 |
| | Trial 2 | 2 |
| | Trial 3 | 3 |
| | Total | |
| | Average | |

## CHART B

Metric System

1 meter = ____________inches

1 meter = ____________centimeters

English System

1 yard = ____________centimeters

1 foot = ____________centimeters

1 inch = ____________centimeters

4. Fill each of the following with water

quart bottle

pint bottle

cup

ounce glass

5. Measure the volume of water that is in each of the above by using a graduated cylinder. Fill in chart C.

CHART C

How many milliliters are there in each of the following:

1 quart = ______________milliliters

1 pint = ______________milliliters

1 cup = ______________milliliters

1 ounce = ______________milliliters

6. Use the balance to weigh each of the following in grams.

   1. 1 pount weight
   2. 1 ounce weight

7. Complete the following chart for weight.

1 pound is equal to_____________grams.

1 ounce is equal to_____________grams.

Conclusions:

1. Which system is more accurate? Why?

2. Which system is easier to work with? Why?

## METRIC SYSTEM

## CONVERSION SHEET

1. To convert from kilograms to pounds we multiply the kilograms by 2.2 because one kilogram is equal to 2.2 pounds.

2. To convert from pounds to kilograms we multiply the pounds by .45 because one pound is equal to .45 kilograms.

3. To convert from grams to ounces we multiply the grams by .035 because one gram is equal to .035 ounces.

4. To convert from ounces to grams we multiply the ounces by 28.35 because one ounce is equal to 28.35 grams.

5. To convert from meters to inches we multiply the meters by 39.37 because one meter is equal to 39.37 inches.

6. To convert from kilometers to miles we multiply the kilometer by .62 because one kilometer is equal to .62 miles.

7. To convert from miles to kilometers we multiply the miles by 1.609 because one mile is equal to 1.609 kilometers.

8. To convert from liters to quarts we multiply the liters by 1.0567 because 1.0567 quarts is equal to one liter.

9. To convert from quarts to liters we multiply the quarts by .946 because one quart is equal to .946 liters.

10. To convert from gallons to liters we multiply the gallons by 3.785 because one gallon is equal to 3.785 liters.

# GUEST SPEAKER

## MEDICAL LABORATORY TECHNICIAN

Where does he or she work?

What skills are required in his (her) job?

What equipment does a Medical Laboratory Technician use?

How is the metric system important to them?

Now that you have studied the metric system and worked with it, we can look at some of the professions in allied health that use it every day. Your teacher will discuss with you each job and some background information about them. Record the basic job description and requirements for entering this field.

1. Medical Laboratory Technician

2. Dietitian

3. Certified Laboratory Technician

4. Intravenous Nurse

5. Dental Laboratory Technician

6. Biochemist

7. Pharmacist

8. Physician

9. Dentist

# UNIT 111
# HUMAN BODY

# INTRODUCTION

All medical professions are associated to some degree with the human body. It is important that you have a general orientation to the human body and the location and function of its organs. In this unit you will complete charts of each system and study the function of its parts. During the unit you will discuss the allied health professions that relate closely to the human body.

# ACTIVITIES

In the following section you will be given a list of words to define that relate to a system of the human body. You will also receive a second list of words to label on the accompanying diagrams. As your teacher discusses each system he will brainstorm with you to form definitions of each of the words.

## HUMAN BODY

A. Basic

1. Cell - the building material of all living things
2. Cell Membrane - the outer covering of the cell
3. Nucleus - contains the chromatin network and controls some of the activities of the cell.
4. Nucleolus - works to control nuclear function and cellular reproduction.
5. Tissue - specialized cells grouped together with a similar function.
6. Organs - groups of tissue working together with a similar function.
7. Systems - several organs and parts grouped together for certain functions.

B. Body Systems

1. Skeletal System - the basic framework of the body with over 200 bones.
2. Muscular System - Body movements are due to the action of the muscles which are attached to the bones. Other types of muscles are present in the walls of the intestine and the heart.
3. Circulatory System - the heart, blood vessels, lymph vessels and lymph nodes all make up the system whereby blood is pumped to all parts of the body tissues.
4. Digestive System - all organs which have to do with taking in food and converting the useful parts into substances that the body cells can use.

5. Respiratory System - includes the lungs and the passages to and from them. Takes in air, extracts oxygen, and expels carbon dioxide.
6. Urinary System - filters out and rids the body of certain waste products taken by the blood from the cells.
7. Nervous System - the brain, spinal cord, and the nerves all make up this very complex system by which all parts of the body are controlled and coordinated.

C. Directions in the Human Body

1. Superior - is a relative term meaning "above" or "in a higher position".
2. Inferior - means below or in a lower position.
3. Ventral and Anterior - located near the belly surface or front of the body.
4. Dorsal and Posterior - refer to the back.
5. Cranial - means near the head.
6. Medial - means near an imaginary plane that passes through the midline of the body, dividing it into right and left portions.
7. Lateral - means farther away from the midline.

D. Body Cavities

Thoracic Cavity - Contains mainly the heart, the lungs, and the large blood vessels.

Abdominal Cavity - Contains the stomach, most of the intestines, the kidneys, the liver, the gallbladder, the pancreas, and the spleen.

Pelvic Cavity - Contains the urinary bladder, the rectum, and the internal parts of the reproductive system.

Because the health field is related to the human body, it is important that all disciplines have an understanding of the human body. We will now look at the careers that work most directly with the human body.

1. Physician
2. Dentist
3. Nurse: Practical, Registered
4. Physical Therapist
5. Occupational Therapist
6. Hystological Therapist
7. Pathology Assistant
8. Orthotist
9. Orthopedic Assistant
10. Prosthetic Assistant
11. Radiological Technician
12. Cardopulmonary Technician
13. Inhalation Therapist
14. Emergency Medical Technician
15. Orderly
16. IV Nurse
17. Optician

## Basic Structures of the Human Body

### Define

1. Cell Membrane

2. Cytoplasm

3. Nucleus

4. Chromosomes

5. Heredity

6. ATP

7. Mitosis

8. Meosis

9. Cell

10. Tissue

11. Organ

12. System

13. Thorax

14. Abdomen

15. Extremities

## Skeletal - Muscular System

Define each of the following:

1. Skeletal System

2. Muscular System

3. Skull

4. Spinal Column

5. Ribs

6. Marrow

7. Joints

8. Ligaments

9. Ball and Socket

10. Pivot Joint

11. Hinge Joint

12. Contract

13. Relax

14. Voluntary

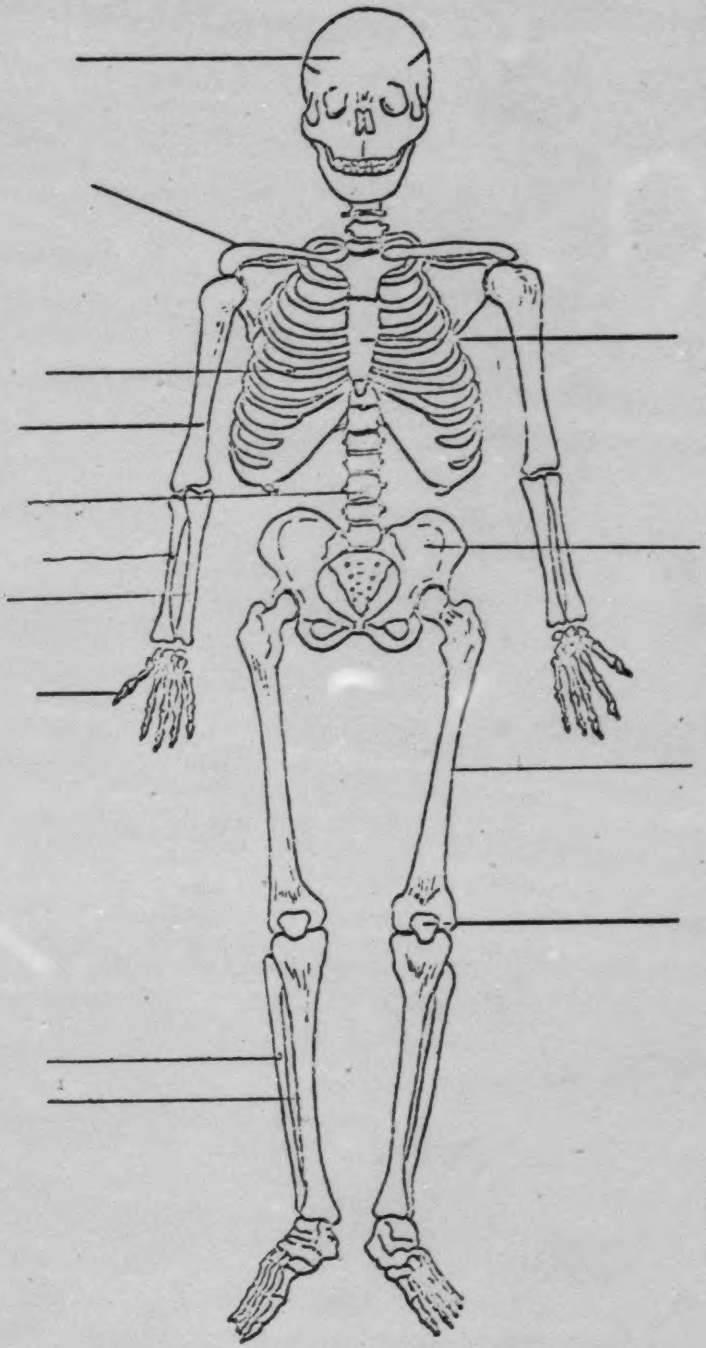
15. Involuntary

16. Stimulus

17. Tendon

## Human Skeleton – Anterior View

# SKELETAL SYSTEM

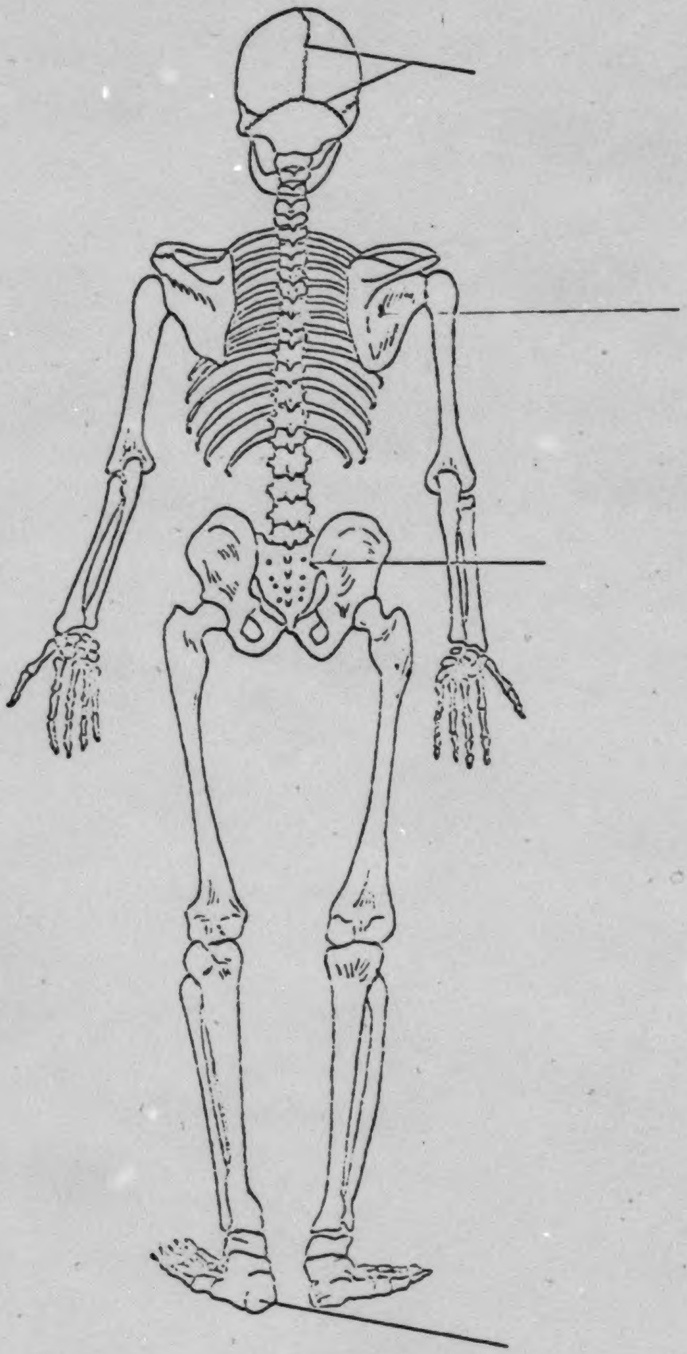


Anterior View
(Front)

COPYRIGHT, 1973, J. WESTON WALCH, PUBLISHER, PORTLAND, MAINE 04104

Human Skeleton – Posterior View

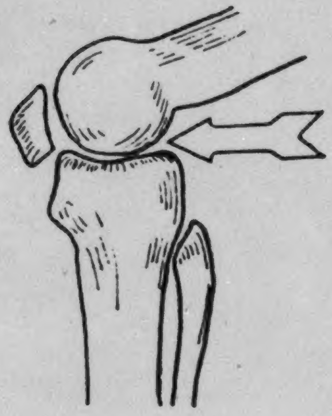
# SKELETAL SYSTEM



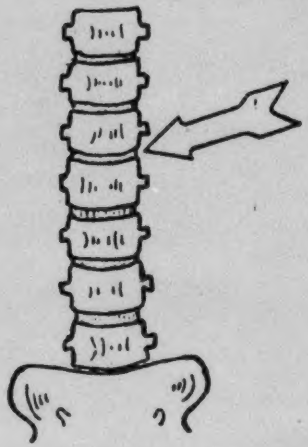
Posterior View
(Back)

COPYRIGHT, 1973, J. WESTON WALCH, PUBLISHER, PORTLAND, MAINE 04104

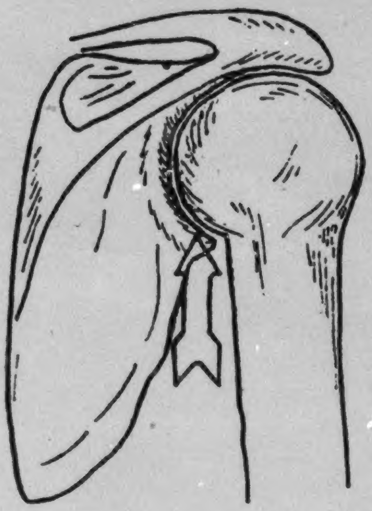
# Joint Types



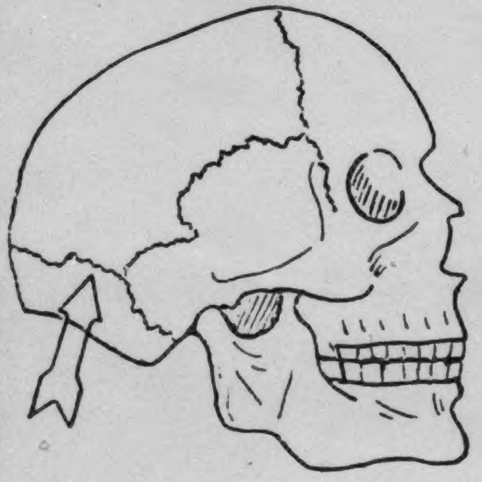
Hinge Joint



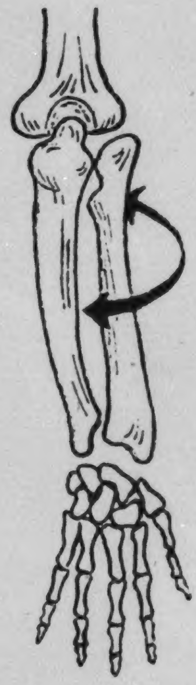
Gliding Joint



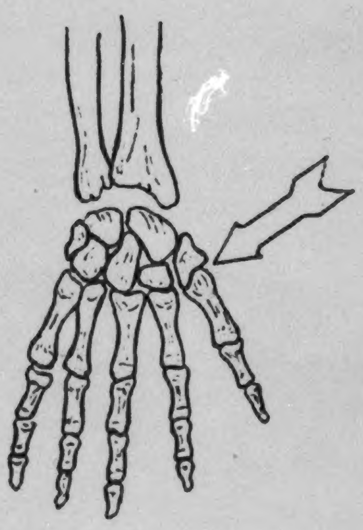
Ball and Socket Joint



Immovable Joint



Pivot Joint



Saddle Joint

COPYRIGHT, 1973, J. WESTON WALCH, PUBLISHER, PORTLAND, MAINE 04104

# Respiratory-Circulatory-Lymphatic Systems

Define each of the following:

1. Inspiration

2. Expiration

3. Blood

4. Plasma

5. Nutrients

6. Vitamins

7. Hormones

8. Hemoglobin

9. Anemia

10. Red Blood Cells

11. White Blood Cells

12. Platelets

13. Artery

14. Vein

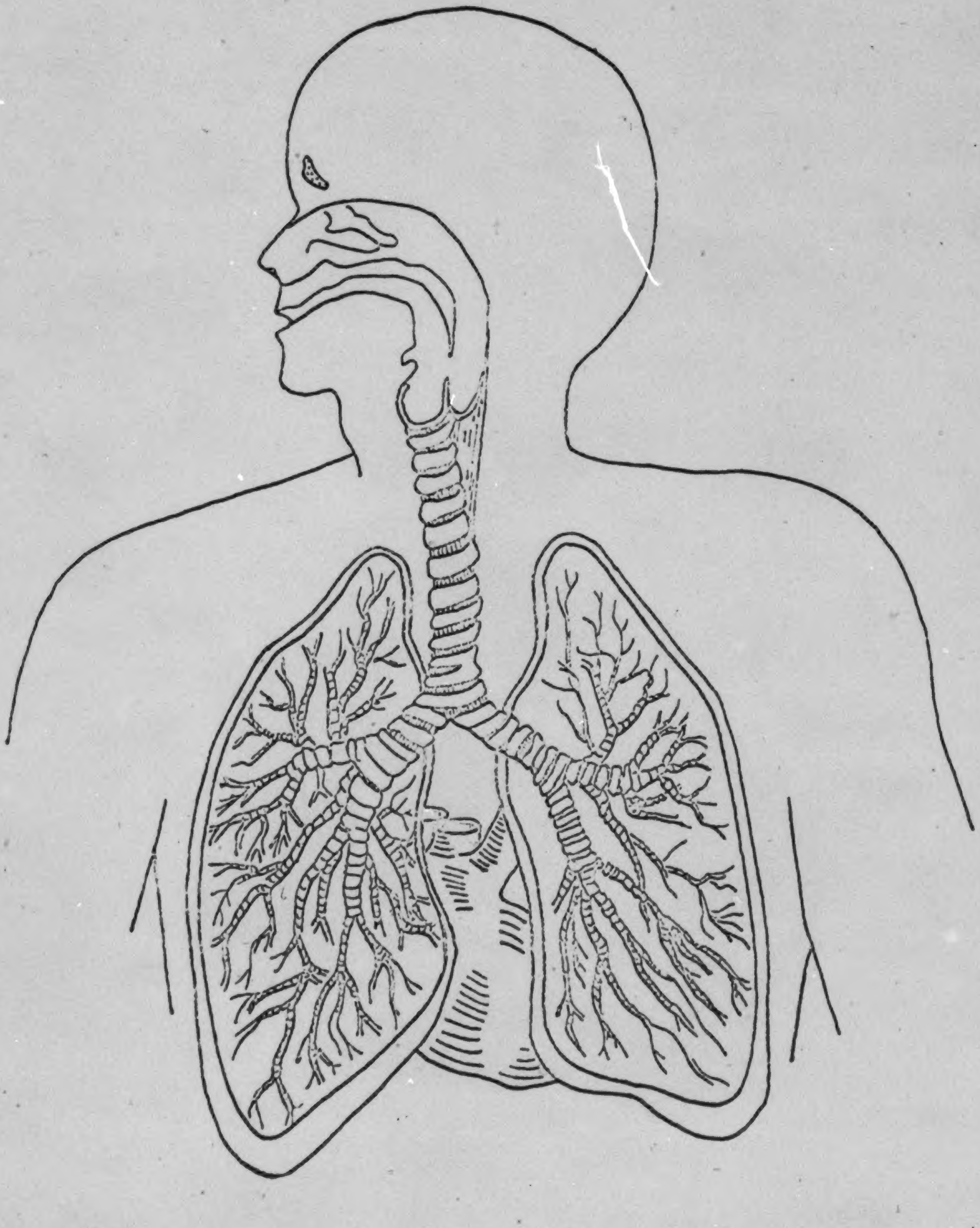
15. Capillary

16. Lymph

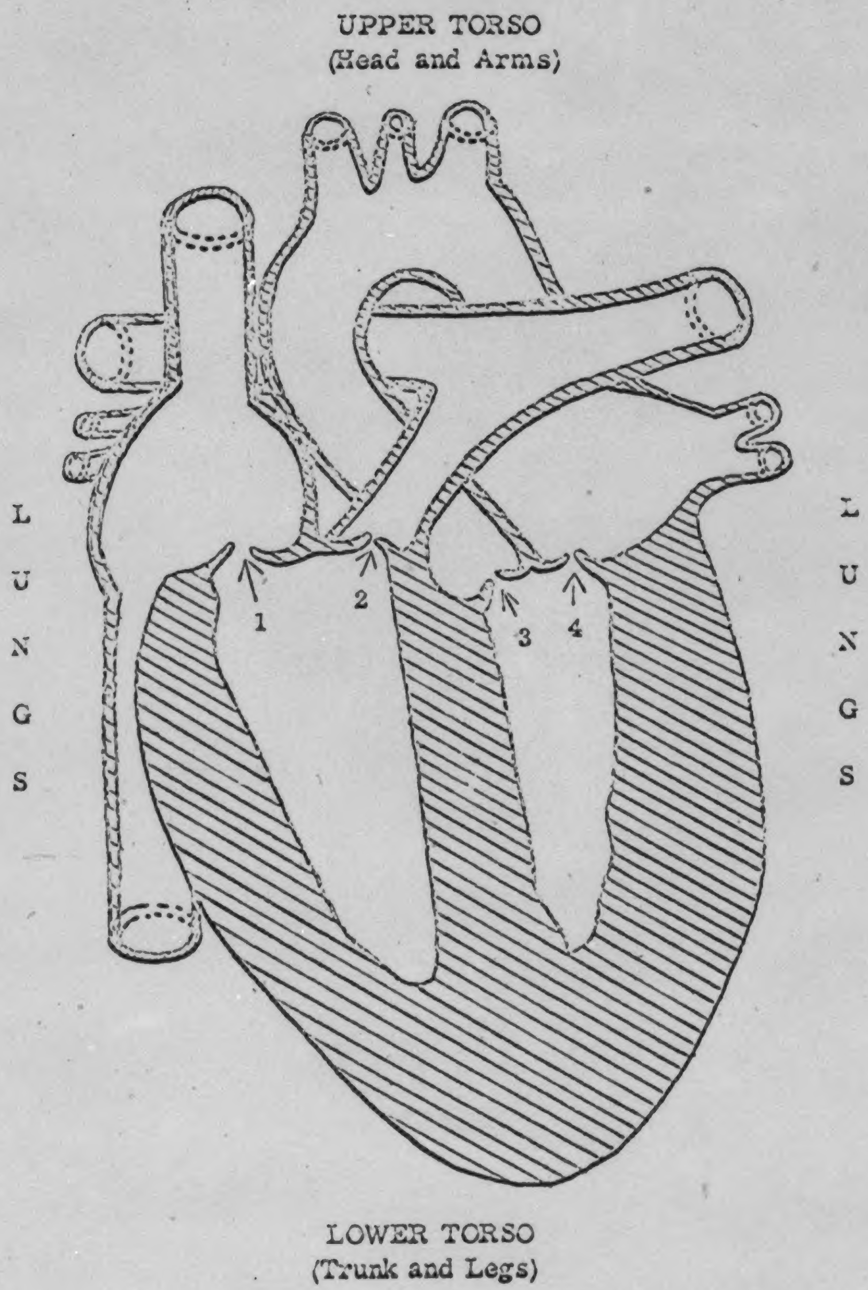
Label the following on the accompanying diagram:

1. Trachea
2. Bronchi
3. Bronchial Tubes
4. Lungs
5. Alveoli
6. Artery
7. Capillary
8. Vein
9. Lymph Nodes
10. Heart
11. Atrium
12. Ventrial
13. Aorta
14. Inferior and Superior Vena Cava

# RESPIRATORY SYSTEM



COPYRIGHT, 1973, J. WESTON WALCH, PUBLISHER, PORTLAND, MAINE 04104


UPPER TORSO
(Head and Arms)
L U N G S
L U N G S
1
2
3
4
LOWER TORSO
(Trunk and Legs)

COPYRIGHT, 1973, J. WESTON WALCH, PUBLISHER, PORTLAND, MAINE 04104

# Digestive System

Define each of the following:

1. Enzyme

2. Digestion

3. Saliva

4. Gastric Juice

5. Amino Acids

6. Bile

7. Protein

8. Fat

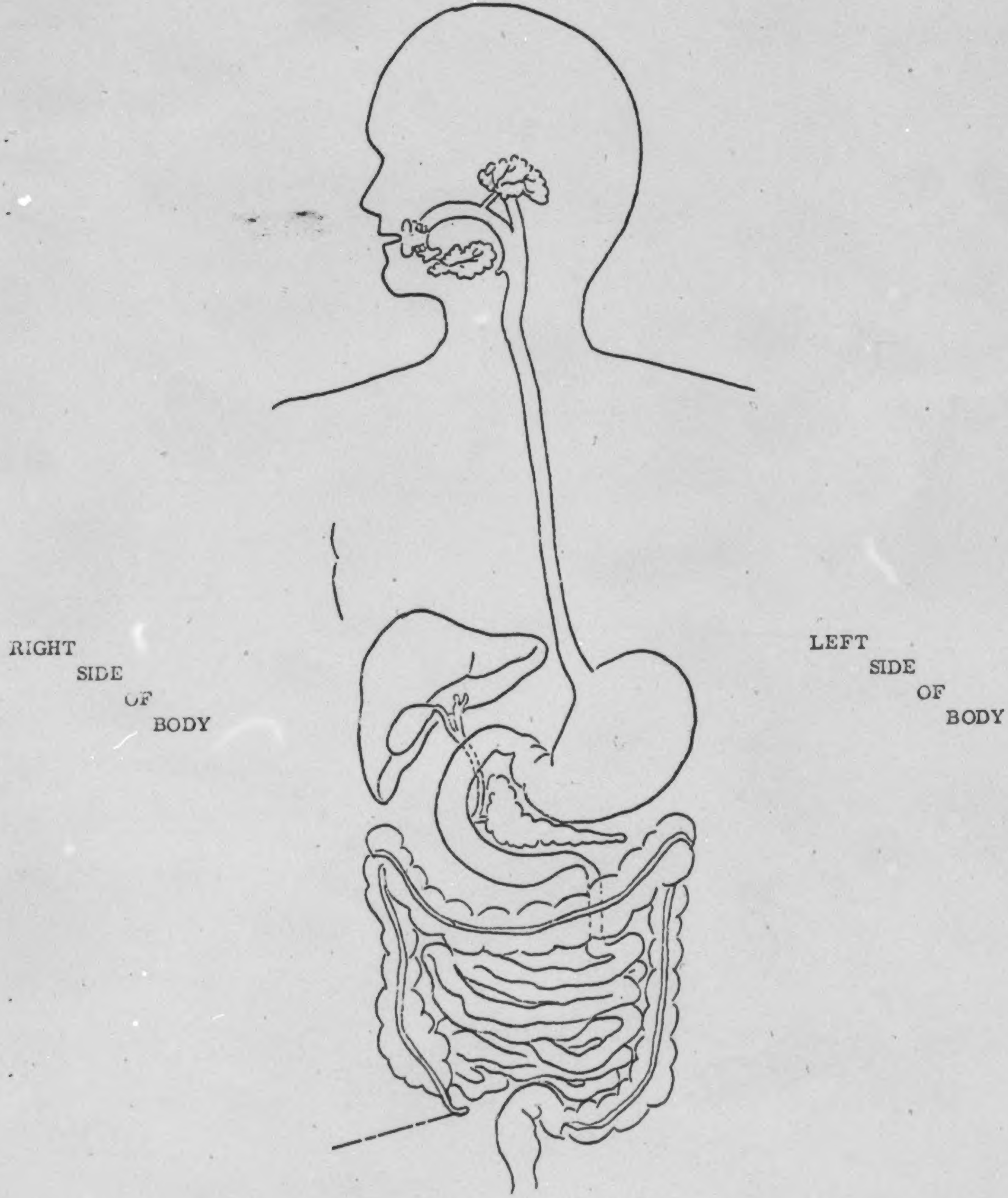
9. Carbohydrate

10. Calories

Label the following on the accompanying diagram:

1. Mouth
2. Salivary Glands
3. Esophagus
4. Stomach
5. Liver
6. Gallbladder
7. Pancreas
8. Small Intestine
9. Large Intestine
10. Rectum

# DIGESTIVE SYSTEM


RIGHT SIDE OF BODY
LEFT SIDE OF BODY

COPYRIGHT, 1973, J. WESTON WALCH, PUBLISHER, PORTLAND, MAINE 04104

## Excretory System

Define each of the following:

1. Elimination

2. Excretion

3. Urine

4. Reabsorption

5. Pores

6. Dermi

7. Epidermi

Label the following:

1. Kidney
2. Ureter
3. Bladder
4. Urethra
5. Dermis
6. Epidermi

## Section VI Nervous-Sensory System

Define each of the following:

1. Central Nervous System
2. Peripheral Nervous System
3. Autonomic Nervous System
4. Neuron
5. Dendrite
6. Axon
7. Medulla
8. Pons
9. Cerebellum

10. Midbrain

11. Cerebrum

12. Reflex action

13. Sensory Neuron

14. Motor Neuron

15. Synapse

16. Acetylcholine

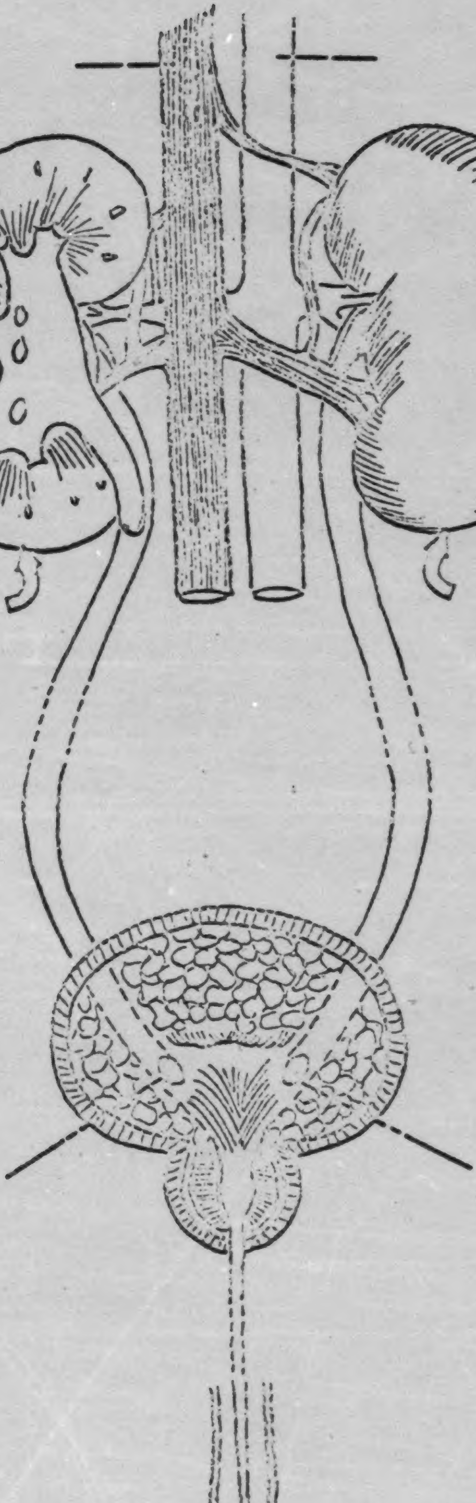
17. Receptor

18. Chemical senses

Identify the following areas on the accompanying diagram:

1. Neuron
2. Dendrite
3. Axon
4. Medulla
5. Pons
6. Cerebellum
7. Midbrain
8. Cerebrum
9. Spinal cord

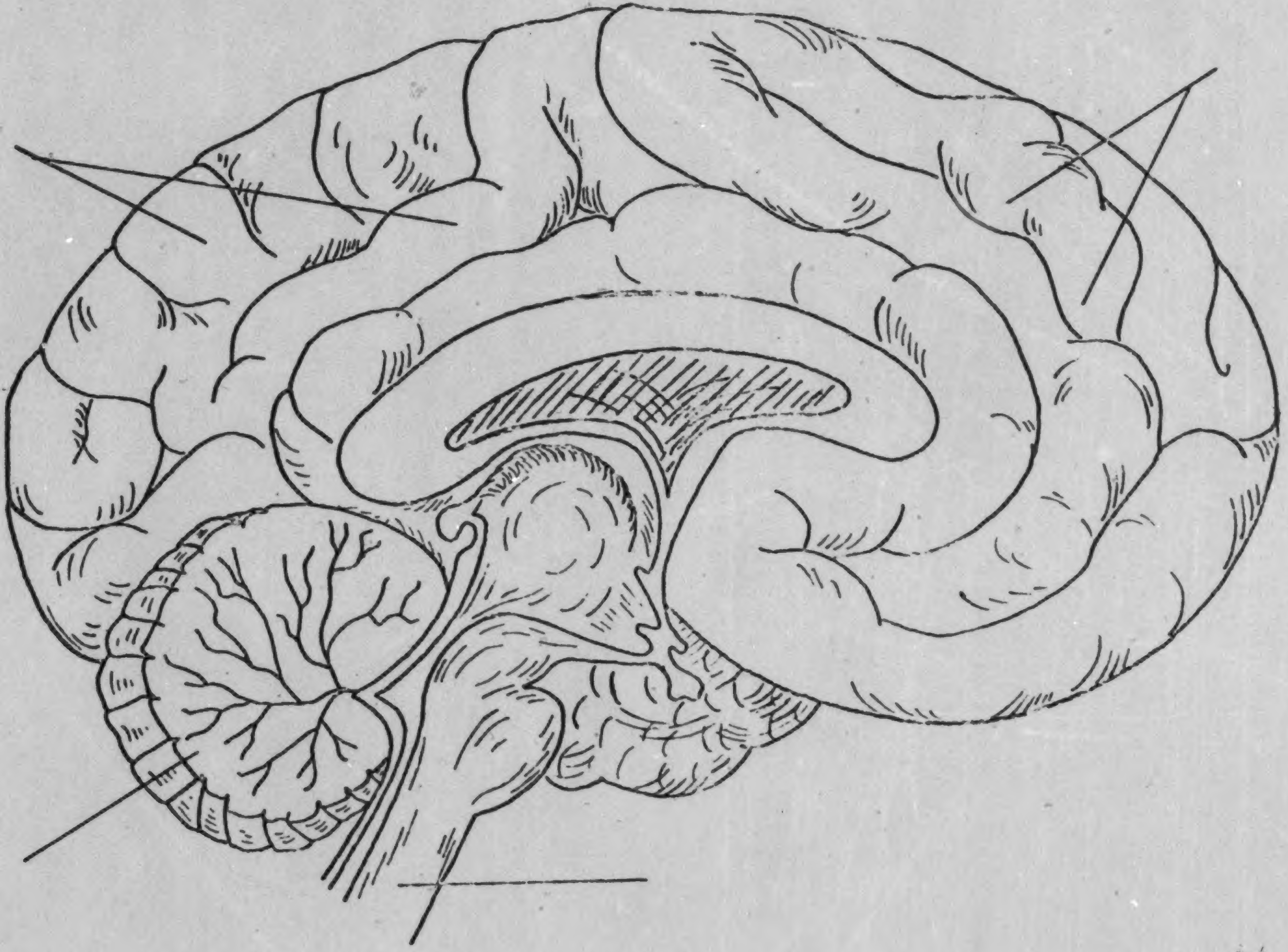
# Urinary Structures



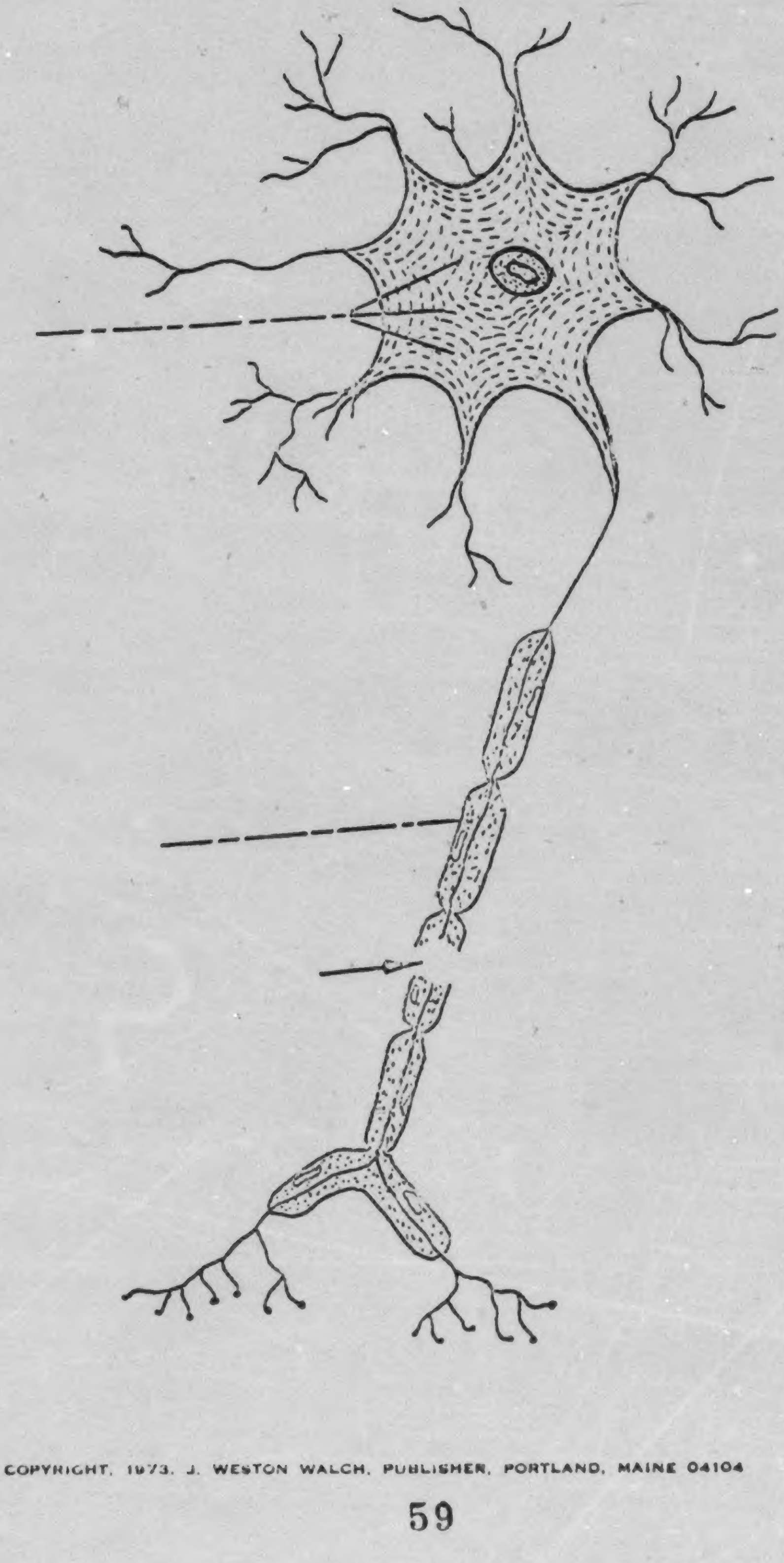
COPYRIGHT, 1973, J. WESTON WALCH, PUBLISHER, PORTLAND, MAINE 04104

## Saggital View of the Brain

MISCELLANEOUS

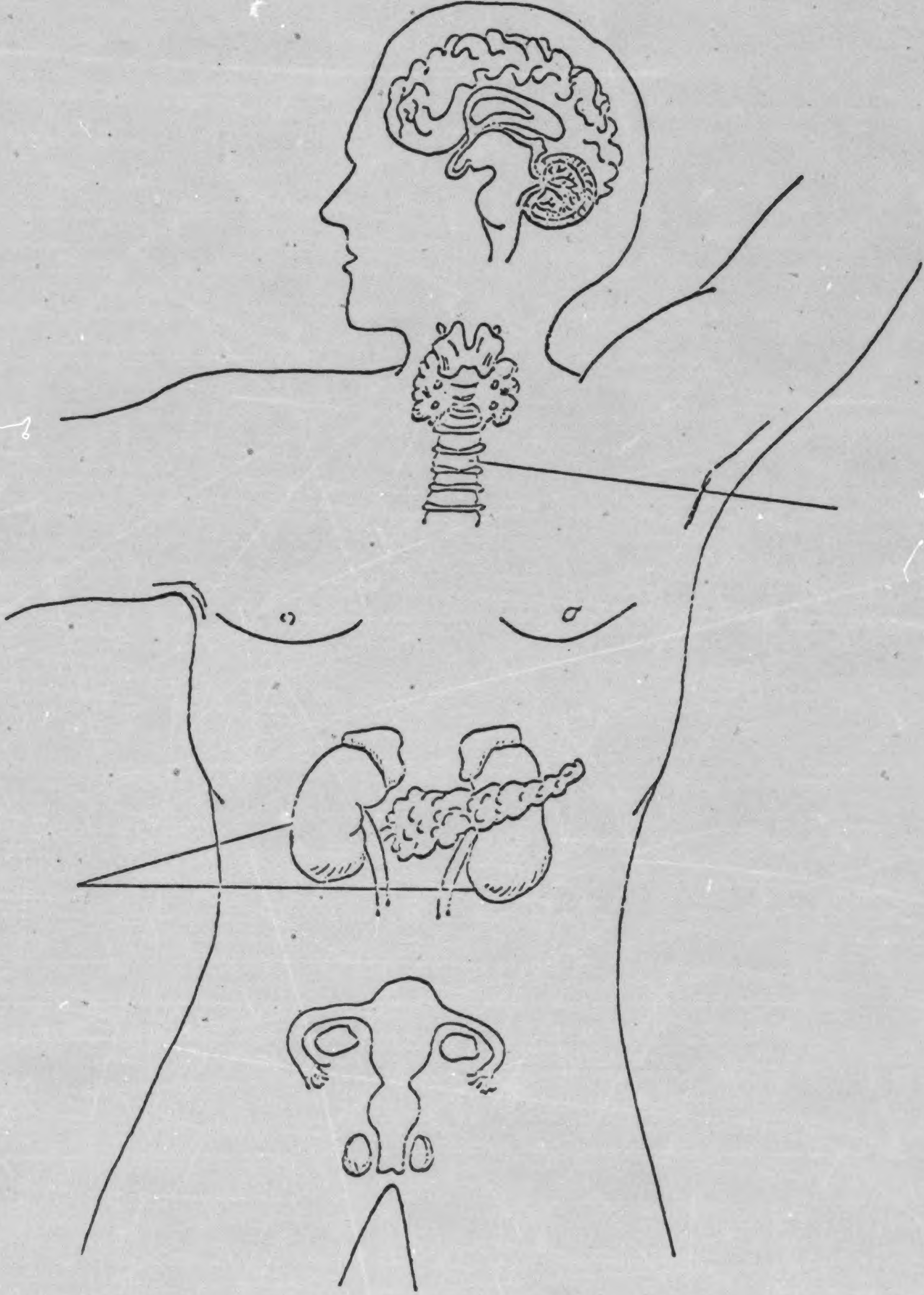


COPYRIGHT, 1973, J. WESTON WALCH, PUBLISHER, PORTLAND, MAINE 04104



COPYRIGHT, 1973, J. WESTON WALCH, PUBLISHER, PORTLAND, MAINE 04104

# Location of Endocrine Glands



COPYRIGHT, 1973, J. WESTON WALCH, PUBLISHER, PORTLAND, MAINE 04104

## Endocrine System

Define each of the following words:

1. Hormone

2. Thyroid Gland

3. Parathyroid Gland

4. Isles of Langerhan

5. Pancreas

6. Pituitary

7. Adrenal Gland

8. Ovaries

9. Testes

Identify the following areas on the accompanying diagram:

1. Thyroid Gland
2. Parathyroid Gland
3. Pancreas
4. Pituitary
5. Adrenal Gland
6. Ovaries
7. Testes

GUEST SPEAKER ____________________

# UNIT IV
# CHEMISTRY

# OBJECTIVES

The objectives of this unit are that the student will be able to:

1. Compare the charge and mass of electrons, protons and neutrons and identify their importance to the structure of an atom.
2. Predict the properties of an element by using the periodic table.
3. Write the chemical symbols for the most commonly used elements.
4. Compare the physical and chemical properties of metals and non-metals.
5. Be able to write and balance simple chemical equations.
6. Understand the mechanism by which matter changes from one state to another.
7. Compare the activity of several metals by their rate of reaction with HCl.
8. Be able to discuss and prove that matter is neither created nor destroyed but only changed in its appearance in a chemical reaction.
9. Explain how chemistry applies to the Allied Health Professions.
10. Relate chemistry laboratories to Allied Health job requirements.

# ALLIED HEALTH PROFESSIONS

All bodily processes depend on chemical reactions, and there are many health professions that deal directly with them. The following is a list of some of the professions that deal more directly with chemistry and the human body. Your teacher will discuss them with you, and you will have a guest speaker from one of the fields talk to you at the end of this unit.

1. Certified Laboratory Assistant

2. Cytotechnologist

3. Histological Technician

4. Medical Laboratory Technician

5. Cardiopulmonary Technician

6. Inhalation Therapist

7. Pharmacy Technician

8. Dietitian

9. I.V. Nurse

10. Clinical Chemist

11. Clinical Microbiologist

12. Nurse Anesthetist

13. Pharmacist

# CHEMISTRY VOCABULARY

During this unit you will be introduced to many new words. It is important that you understand each word as it is used in chemistry. With your teacher brainstorm and develop definitions for each of the following words:

1. electron

2. neutron

3. proton

4. nucleus

5. orbit

6. endothermic

7. exothermic

8. solvent

9. solute

10. compound

11. mixture

12. solution

13. oxide

14. element

15. Periodic Table

16. Matter

17. Solid

18. Liquid

19. Gas

20. Physical Change

21. Chemical Change

22. ion

23. molecule

24. atomic number

25. atomic mass

26. metal

27. non-metal

28. isotope

29. catalyst

30. distillation

31. electrolysis

32. sublimation

33. hydrogen bond

34. covalent bond

35. density

36. specific gravity

37. polar

38. saturation

39. supersaturation

40. evaporation

41. precipitate

42. synthesis

43. hydronium ion

44. hydroxide ion

45. Acid

46. Base

47. Neutral

48. Salt

49. Litmus paper

50. phenolphthalein

51. titration

52. pH

The following is a chart of 25 commonly known elements. You are to complete this chart by writing the symbol for the chemical, whether it is a metal or non-metal, and if it is a solid, liquid or gas at room temperature.

| | Name | Symbol | Metal or Non-metal | Solid, Liquid or Gas |
|---|---|---|---|---|
| 1. | Aluminum | | | |
| 2. | Argon | | | |
| 3. | Calcium | | | |
| 4. | Carbon | | | |
| 5. | Chlorine | | | |
| 6. | Copper | | | |
| 7. | Fluorine | | | |
| 8. | Gold | | | |
| 9. | Helium | | | |
| 10. | Iodine | | | |
| 11. | Iron | | | |
| 12. | Lead | | | |
| 13. | Mercury | | | |
| 14. | Neon | | | |
| 15. | Nitrogen | | | |

16. Oxygen

17. Phosphorus

18. Platinum

19. Potassium

20. Silver

21. Sodium

22. Sulfur

23. Tin

24. Uranium

25. Zinc

The following are samples of some of the laboratories you will be doing in class. Remember that in all medical professions that accurate records must be kept so that you remember just what happened and why. Also, when you report your results, you have all the necessary medical laboratory technician's information at hand.

What are the differences between a mixture and a compound?

**Purpose:** To become familiar with the properties of mixtures and compounds.

**Materials:**
Iron Filings
Sulfur
Test Tubes
Magnet
Spoon
Bunsen Burner or Alcohol Lamp
Filter Paper
Test Tube Holder
Beaker
$H_2O$

**Procedure:**

1. Mix one spoonful of iron filings with two spoonfuls of sulfur. Place mixture on some filter paper and try to remove the iron with a magnet.
2. Mix one spoonful of iron filings with two spoonfuls of sulfur. Place the mixture into a test tube and heat slowly. (Remember: Hold test tube with test tube holder at an angle away from you and anyone else in the lab). You will see a yellow-orange flame, allow it to continue until all the mixture has reacted. At this point pour the contents of the test tube into a beaker of cold water. Remove the product and replace it on some filter paper. Use a magnet to remove the iron filings from the sulfur. What happened? Is this still only a mixture?

## QUESTIONS

1. Why are you able to separate the iron filings from the sulfur in step 1?
2. Why were you unable to separate the iron filings from the sulfur in step 2?
3. What can you say about the properties of substances in a mixture? Are they changed or unchanged? Why?
4. What are some of the properties of substances in a compound? Are they changed or unchanged? Why?

5. How do the physical and chemical properties of mixtures and compounds compare?
6. What happens in a chemical change?

# ACIDS AND BASES

I. **Purpose**: To study ways to identify acids and bases, and how they reset with each other.

II. **Materials**: HCl, $H_2SO_4$, Distilled $H_2O$, NaOH, $NH_3OH$, Hydronium Ion Paper, Red and Blue Litmus Paper, Eye Dropper, Petri Dish.

III. **Procedure**: Take a bottle of acid, water and base. Also three (3) strips and red and blue litmus paper, three (3) petri dishes, and four (4) strips of hydronium ion paper.

Place a strip of red and blue litmus paper in each petri dish. Place a drop of acid on the paper strips in the first dish. Record what happened. Place a drop of water on the paper strips in the second dish. Record what happened. Place a drop of base on the paper strips in the third dish. Record what happened.

Remove the litmus paper from the three dishes and dry them. Place a strip of hydronium ion paper in each dish and place a drop of acid on the first strip, a drop of water on the second, and a drop of base on the third. What do you observe as you drop each liquid on the paper?

Compare the results with the charts supplied with the hydronium paper. Clean the petri dishes again. This time put a drop of acid and a drop of base in one dish. Test the pH of the two drops when mixed. Now take four bottles marked unknown on the desk. Test each in the above manner and tell if they are acid or base and what they record on the pH scale.

## How do we use use litmus paper to tell if liquids are acid or base?

Introduction: Chemicals used in the laboratory can be grouped into two categories, Acids and Bases. In this laboratory we will study how we use litmus paper as an indicator to put liquids into one of these categories.

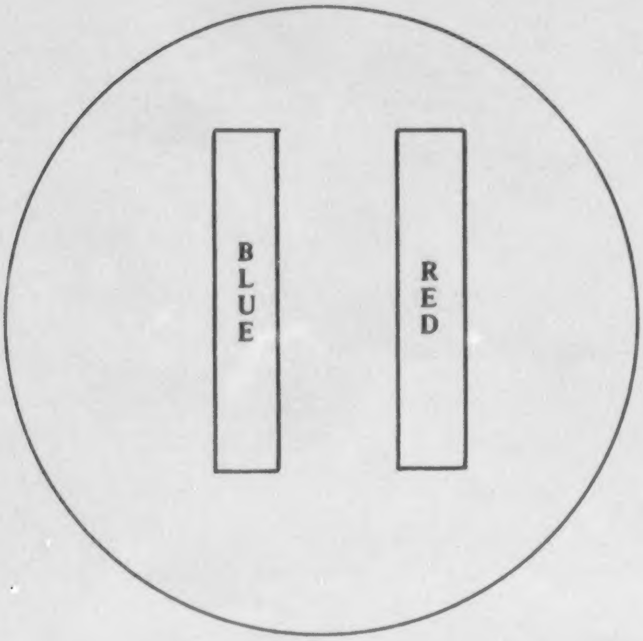
Materials:

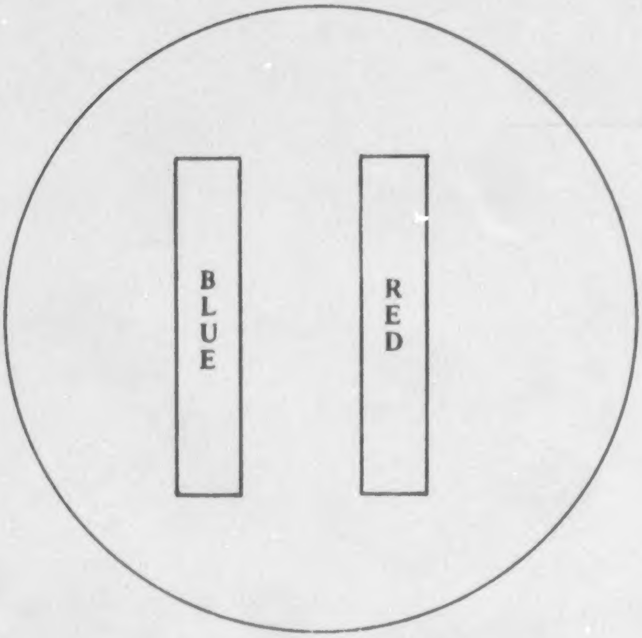
- Red litmus paper
- Blue litmus paper
- Petri Dishes
- Hydronium Ion Paper

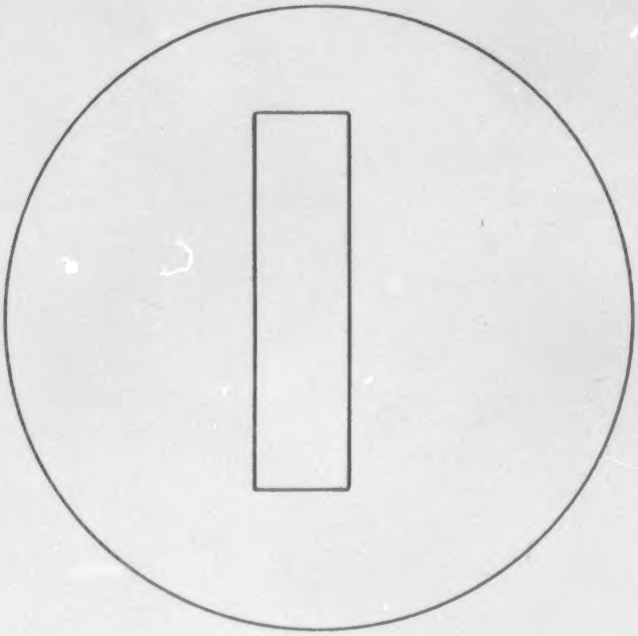
Procedure:

1. Put a strip of blue litmus paper into each of two shallow dishes. Also, put one strip of red litmus paper in each of the same dishes.
2. Get each of the bottles marked acid and base.
3. Place a drop of acid on the paper in one of the dishes and record your results.
4. Place a drop of base on the paper in the other dish and record your results.
5. Now get two strips of hydronium ion paper. Place one strip in each of two clean dishes.
6. Now place a drop of acid on one strip of hydronium ion paper and compare its color with the chart supplied.
7. Repeat step 6 but use your base.
8. Now take four bottles marked unknown on the desk. Test each in the above manner and tell if they are acid or base and what they record on the hydronium ion scale.

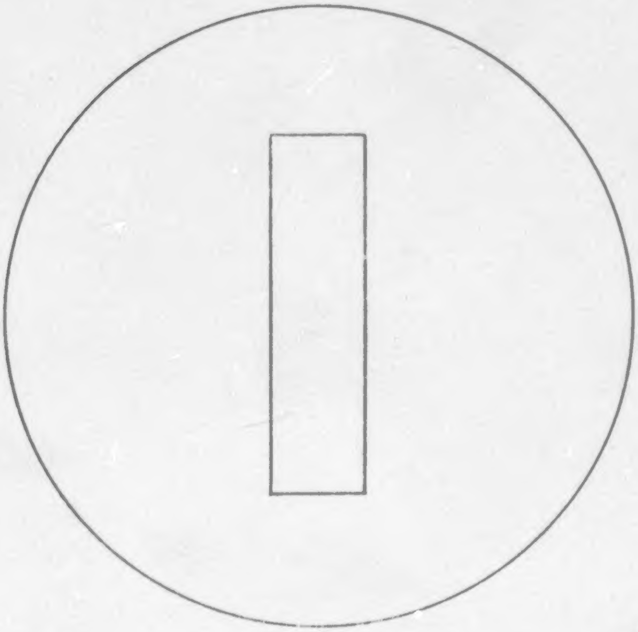
## Charts





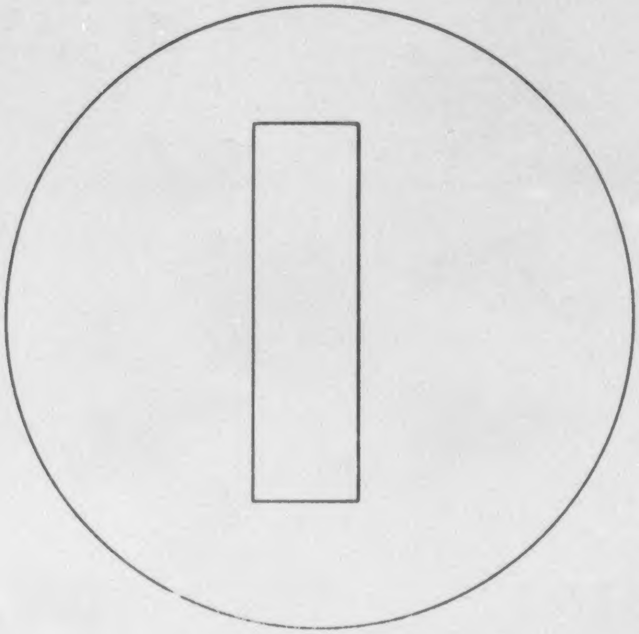


Acid



Base

Unknown Chart



Complete the following chart of characteristics of matter.

| OBJECT | Definite Shape | Definite Weight | Odor | Surface Rough<br>Smooth | Takes shape of container | Has definite volume | Has no definite volume | Visible | Transparent | Slippery - oily | Dry | Color | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

## Properties of Solids, Liquids and Gases

1. Matter exists in one of these three states: solid, liquid or gas. In this experiment you will examine some of the properties of each of these states.

Purpose: To become familiar with the properties of solids, liquids and gases.

Materials:

- Block of Balsa Wood
- Block of Oak Wood
- Small rocks
- Foam rubber
- Cork
- Wax
- Hydrometer
- Carbon Tetrachloride
- Water
- Gasoline
- Alcohol
- Mercury
- Balloon
- Scale
- Milk
- Rubber Stopper
- Graduated Cylinders
- Overflow Cans
- Candle
- Beaker
- Cotton Swabs
- Zinc
- Hydrochloric Acid
- String
- Iron Nail

Procedure:

1. Obtain the following solid objects and observe and record the characteristics of this hardness.
   - A. 2 different types of wood
   - B. Some marbles
   - C. 2 different types of rocks
   - D. 2 different types of metals
   - E. Block of Rubber
   - F. Clay
2. For the regular shaped objects measure their volume (length x width x height). Record this in chart 1.
3. Using the overflow can, measure the volume of each of the solid objects as follows. Place finger over outlet of overflow can,then fill can with water. Remove finger and collect overflow in your collection can. When flow out of overflow spout has stopped, the level of water in the overflow can will be at the rim of the spout. Discard the water in the collection can. You are now ready to measure the volume of an object. As you place a solid object into water, its level will rise and the amount of water displaced by the object will equal the volume of that object.

   Now take one object at a time and tie a string around it.

Then lower it into a can of water. Collect all the water displaced by the object in the catch can. Measure the volume of this water in a graduated cylinder. Refill the can as stated above and use another object. The wood will have to be pushed under the water but just below the surface.

Record your results in chart #1.

4. Weigh each of the objects and record this on chart #2.
5. To find the specific gravity of an object, we divide its weight by its volume. Record the specific gravity of each object used. Record this in chart #3.
6. Use 5 liquids and measure their volume in a graduated cylinder. Record this in chart #4.
7. Weigh each volume of liquid you have used. Remember you must weigh the contained empty so that you can subtract the weight of the container from the total weight of the container and liquid. Record these results in chart #5.
8. Compute the specific gravity of the liquids by dividing the weight of the liquid by its volume. Record in chart #6. (Optional: to check specific gravity have students use a hydrometer to check their calculations).
9. Remove the air from a basketball, football or volleyball as completely as possible and weigh it in gram. Record this figure in chart D.
10. Pump the ball up as tightly and weigh it again. Record this in chart E. The difference between chart D and E represents the weight of air pumped into the ball.
11. To show that some gases are lighter than others, place some zinc in a test tube. Pour some HCl into the test tube and place a stopper with a glass tube in it into the test tube. As a gas starts to evolve, place a

balloon over the outlet and collect the gas. When the balloon is full, tie a string around it and let the balloon go. Fill a second balloon up by blowing it up, tie it, and let it go. What happened? Why?

12. Teacher Demonstration: Place a candle in the bottom of a large beaker. Light the candle and pour some $CO_2$ into the beaker until the candle goes out. Why?

13. Teacher Demonstration: Liquids have different properties also.
    1. Add 100ml of Mercury to a 1,000ml beaker.
    2. Place an iron nail on top of the mercury.
    3. Carefully pour 100ml of Carbon Tetrachloride ($CCl_4$) on top of the mercury.
    4. Place a rubber stopper on top of the carbon tetrachloride.
    5. Carefully pour 100ml of water on top of the carbon tetrachloride.
    6. Place a small block of wax on top of the water.
    7. Carefully pour 100ml of Gasoline on top of the water.
    8. Place cork on top of the Gasoline.

What do you observe?

QUESTIONS:

1. Are all solid objects the same hardness? If not, why?
2. Will a solid object's volume change if we only change its shape?
3. What does specific gravity of an object tell us?
4. Does air have weight? How do we know this?
5. What properties of hydrogen gas did you see?
6. What can you say about the properties of $CO_2$?
7. What can you say about the physical characteristics of liquids?
8. What determines the shape of liquids?

# CHEMICAL ACTIVITIES

## What is water made of? (Teacher Demonstration)

Purpose: To study the chemicals that make up the water molecule.

Materials: Hoffman Apparatus
Sulfuric Acid
Test Tubes
Splints
Matches
Transformer or Battery

Procedure and Observation:

1. Set up the apparatus with a mixture of water and sulfuric acid. Make sure the mixture fills both tubes.
2. Now connect the transformer or battery to the electrodes and turn on the current.
3. Observe the rate that the bubbles rise from the electrodes.
4. After the gases have collected for several minutes, measure the levels of water in each tube. What relationship do you see?
5. Collect a sample of each gas in a test tube one at a time. In the test tube you collected from the tube with the most gas, insert a lighted splint. What happened? Now, collect a sample of gas from the tube with the lesser amount of gas. Insert a glowing splint. What happened?

Conclusion:

QUESTIONS:

1. What chemicals make up water?
2. What properties do the chemicals that make up water have that water does not have?
3. Why did the chemicals lose those properties?
4. How can we form water?

# FLAME TEST

In the laboratory there are many ways to identify chemicals. One way commonly used is to burn the chemical and observe the color of its flame.

Purpose: In this laboratory you will study the color of the flame of individual metals as used to identify them.

Materials:

Platinum wire loop
Bunsen Burner

Procedure:

1. Obtain a solution of each of the listed metal salts.
2. Light the Bunsen burner and adjust the flame so that you have a blue flame.
3. Dip the platinum loop into each solution, one at a time, then place it into the flame and observe the color change that takes place in the flame. Record your results in Chart A. Do this several times for each salt solution until you can identify the same color for each individual metal.
4. Now obtain a set of unknowns and run them through the flame test. Identify each of the metals.

Optional:

5. Obtain a spectroscope and run these salts through the flame test again. What do you observe?

Conclusion:

## QUESTIONS

1. Do all metal solutions have the same color? How is this helpful?

The following is a list of other laboratories that your teacher may include in this unit. Remember that as you go through each laboratory you will be making many observations, and you will need to keep accurate records so that you can draw logical conclusions. These are the same basic methods laboratory staff follow in their work in the medical or research fields.

1. Methods of separating a mixture
2. Exothermic and Endothermic Reaction
3. Production of Soap
4. Properties of $CO_2$
5. Properties of $O_2$
6. Conservation of Matter in a Chemical Reaction
7. Properties of Metals and Non-metals

# UNIT V

# ELECTRICITY AND MAGNETISM

# INTRODUCTION

Electricity and Magnetism are very closely related subjects. Electrical currents produce a magnetic field around them as the electrons move. As magnets move, they can cause electrons to move, thus producing electricity. In this unit you will study the phenomenon of electricity, magnetism and electromagnetism. After you have completed your studies of them, you will work with their application to the allied health field. The following is a list of some of the experiments that your teacher will include in this unit.

1. Parallel Circuits
2. Series Circuits
3. Magnetic Fields Around a Wire
4. An Induction Coil
5. Magnetic Fields
6. The effects of magnets on each other

# MEDICAL PROFESSIONS RELATED TO ELECTRICITY

The human body is run by electrical currents that travel in the nervous system to all parts of it. Everything we do, including reading this, is done by small electrical currents within your body. The following are a list of some of the job opportunities that are available for those interested in electricity and an allied health profession. Your teacher will discuss with you each of the following jobs. You can use your reference books for additional information.

1. Electroencephalograph Technician EEG
2. Electrocardiograph Technician EKG or ECG
3. Electromyograph Technician EMG
4. Biomedical Equipment Technician
5. Computer Programmer
6. Maintenance: Air-Conditioning
   Engineering
   Electrician
   TV and Radio Repair

# OBJECTIVES

1. The student will be able to explain the difference between direct current and alternating current.
2. The student will be able to assemble a simple parallel circuit and a simple series circuit.
3. The student will be able to discuss ways of generating electricity.
4. The student will be able to draw the magnetic fields around a wire and a magnetic.
5. The student will be able to discuss the effects of magnets on electric current and electric currents on magnets.
6. The student will be able to discuss the function of the nervous system and electric currents in the body.

# ELECTRICITY AND MAGNETISM

## VOCABULARY: ELECTRICITY

alternating current

ammeter

ampere

circuit

current

direct current

dynamo

electromagnetic

filament

fuse

galvanometer

generator

incandescent

induction coil

insulator

ohm

parallel circuit

resistance

rheostat

series circuit

terminal transformer

tungsten

voltaic cell

voltmeter

# VOCABULARY: MAGNETISM

compass

demagnetize

domain

loadstone

magnet

magnetic

magnetic field

magnetic storm

# TEACHER DEMONSTRATION

## ELECTRICITY, MAGNETS AND THEIR MAGNETIC FIELDS

Purpose: To show the students the properties of magnetic fields produced by electricity and magnets.

Materials:

1. Overhead Projector
2. Iron Filings
3. Wire
4. Two iron nails
5. Glass or plexi plastic sheet
6. Two bar magnets
7. Two horseshoe magnets
8. Two round magnets

Procedure:

1. Your teacher will set up the overhead projector and put a wire across the viewing stage. After placing a sheet of plexiglass over the wire, he (she) will sprinkle some iron filings over the wire. Is there any pattern to the iron filings?
2. Without changing anything, your teacher will connect the wire to a battery. Is there any change to the pattern of the iron filings?
3. Following the same procedure your teacher will set up a coil of wire around a nail. First observe the pattern of the iron filings without the current on, then with the current on. Explain what you saw.
4. Again setting up the overhead as above, this time he (she) will place a magnet under the glass. As the iron filings are sprinkled onto the glass, what happens?

5. Repeat the procedure in No. 4 with two bar magnets with their N poles toward each other and record the pattern seen. Now observe what happens when the N-S poles are toward each other.

6. Repeat procedure No. 4 and align the magnets parallel with the N-N and S-S poles opposite each other. Record the patterns developed. Next, reverse one magnet and record the pattern.

7. Now your teacher will combine an electromagnet and two bar magnets. What happened to the bar magnets as the current is turned on when both north poles of the bar magnets are alined with the ends of the electromagnets. Record your results.

8. Repeat No. 7 but place the north pole of the bar magnet with the north pole of the electromagnets north pole and the other bar magnets north pole with the electromagnets south pole. Turn on the current. What did you observe?

Conclusion:

Drawings

Draw diagrams of each wire and magnet your teacher used. Show the pattern the iron filings formed around each wire and magnet.

Question: Why is it important to know the pattern of the field around a wire or magnet?

GUEST SPEAKER

EKG TECHNICIAN

## GUEST SPEAKER

### FERRITIC STIMULATOR

# UNIT VI

# HEAT AND ITS EFFECTS

# INTRODUCTION

Heat is necessary for all types of reaction. If the environment is too cold, natural processes slow down in plants and animals. Man has been able to control his environment by building shelters and heating them. Your body also is heated by the process of metabolism. As you eat food, it is used by the body to build itself up and keep it warm. In this unit you will study the properties of heat and its effect on your life and its role in medicine.

# HEAT

## OBJECTIVES

1. The student will be able to use the three temperature scales: Fahrenheit, Centigrade, and Kelvin, and convert from one to the other.
2. The student will be able to read a thermometer correctly.
3. The student will be able to determine the boiling and freezing points of a substance.
4. The student will be able to compute the effects of high and low pressure on the boiling points of a liquid.
5. The student will be able to graph temperature changes per unit of time and interpret the graph.
6. The student will be able to discuss the application of heat to the allied health fields.

# ALLIED HEALTH PROFESSIONS

Body temperature is a very important factor to monitor when a person is sick or well. It tells us if a petson is sick by going up or down. We need to keep our bodies warm so that it can function properly. If it gets too cold or too hot, we lose our ability to control it and we may die. The following are some of the allied health areas that people are concerned with heat and the human body.

1. Physical Therapist

2. Clinical Chemist

3. All Nurses

4. Medical Laboratory Technician

5. Recreational Therapy Technician

# VOCABULARY

As you go through the unit on heat, you will learn many new words. For each word, listed below, you will brainstorm so that the class may develop one acceptable definition for each one. You will be tested on these words at the end of the unit so make sure that you understand each definition.

1. British Thermal Unit

2. Calorie

3. Centigrade

4. Conduction

5. Contract

6. Convection

7. Evaporation

8. Expand

9. Fahrenheit

10. Friction

11. Humidity

12. Infrared rays

13. Insulation

14. Radiation

15. Specific heat

16. Temperature

17. Thermometer

18. Thermostat

19. Ventilation

# CONVERSION SHEET

When working with heat, we use scales to measure them. The two most common scales are the Fahrenheit and Centigrade. Using the freezing point and boiling point of water as a standard, the two scales are slightly different. For the Fahrenheit scale, water freezes at 30° and boils at 212°. On the Centigrade scale water freezes at 0° and boils at 100°. So that you can convert from one scale to another, we have two very important formulas for you to learn.

To convert from Centigrade to Fahrenheit we use

$$F = \frac{9}{5}(C) + 32$$

To convert from Fahrenheit to Centigrade we use

$$C = \frac{5}{9}(F-32)$$

# STUDENT ACTIVITIES

The following experiments will be included in your unit on heat. Remember to record all observations so that you will have a record of your results and can make accurate conclusions from them.

1. Heating a brass ring
2. Bimetal bar
3. Expansion of Liquids
4. Expansion of Gases
5. Checking the accuracy of a thermometer
6. What does antifreeze do to the freezing points and boiling points of water?
7. Heat transfer

# STUDENT ACTIVITY

**Purpose:** This experiment will show you how much you depend on heat for muscle movement.

| **Materials:** | | |
|---|---|---|
| | Two (2) large beakers (2000 ml) | Paper towels |
| | Ice | Lined writing paper |
| | Water | Pen |
| | Warm water | |

1. Fill the beaker half full of ice.
2. Place your hand in the ice and pour enough water into the beaker to cover your hand.
3. Keep your hand in the ice water for three to five minutes.
4. Remove your hand, dry it off quickly and try to write your name five times.
5. Now quickly place your hand in some warm water for three to five minutes.
6. Again, remove your hand, dry it quickly, and try to write your name five times.
7. Now compare the results of both tries.
   What difference did you see?

What was the feeling of your hand after three minutes in the ice water?

What is the importance of heat treatments when working with stiff muscles?

## YOUR TEMPERATURE CHANGES ALL THE TIME.

Purpose: In this experiment you will change your temperature by doing simple tasks.

Materials:
Oral Thermometer
Clock
Graph Paper

Procedure:

1. Take your temperature while resting at your seat. Record this.
2. Do ten step-ups at your chair. Take your temperature and record it.
3. Do ten more step-ups at your chair, and take your temperature, and record it.
4. Now relax for five minutes and then take your temperature and record it.
5. Relax for five more minutes and take your temperature and record it.

Observation:

1. Looking at your temperature, what can you conclude about the experiment?
2. What can you conclude about the rising of your body temperature?
3. How did your skin feel as you experimented? Why?

# GUEST SPEAKER

# UNIT VII

# FLUID DYNAMICS

# INTRODUCTION

Liquids and gases are often classified together as fluids because they are able to flow and react in similar ways. All processes on earth are dependent upon the action of fluids in one way or another. In this unit you will study the properties of fluids, how we use them everyday and how your body depends on these processes to function.

# OBJECTIVES

After a student has completed this unit, he should be able to explain:

1. How the buoyancy of a submerged object is determined
2. How to determine the buoyant force of water on a floating object
3. Archimedes' Experiment
4. How to determine the solubility of a substance
5. Bernoulli's Experiment
6. What is the relationship between pressure, temperature and volume with repsect to fluids and gases
7. How fluid dynamics are at work in the human body
8. Who are the people that apply the knowledge of fluid dynamics to the human body and how.

# ALLIED HEALTH PROFESSIONS

Fluid dynamics plays an important role in medicine. To administer oxygen, fluids, anesthetics and drugs, all depend on a knowledge of how they will react in the body. The following are some of the people who deal with this everyday:

1. Hemotologist
2. Cytotechnologist
3. Intravenous Therapy Technician
4. Inhalation Therapist
5. Nurse Anesthetist
6. Pulmonary Function Technician

# VOCABULARY

As you go through this unit, you will brainstorm with your teacher to develop a good definition. Write this definition in the space provided.

1. Altimeter
2. Archimedes' Principle
3. Barometer
4. Bernoulli's Principle
5. Buoyancy
6. Compress
7. Density
8. Pascal's Principle
9. Pressure
10. Specific Gravity
11. Vacuum

# ACTIVITIES

The following list of experiments will help you to understand the properties of fluids and how they work in the human body. Remember to keep accurate records of all your observations so that you can draw a proper conclusion.

Pascal's Principle
Archimedes' Principle
Bernoulli's Principle
Determination of Specific Gravity
Temperature and Solubility
Air Has Weight
Magdeburg Hemispheres Experiment
How can Air Pressure be Measured?
Can Compressed Air Do Work?
What are Thermal Currents?
Heat Causes Winds
How Are Clouds Formed?
What is Sound Made of?
Pressure and Breathing
Pressure and Kidney Function

# UNIT VIII

# WAVE MOTION AND SOUND

# INTRODUCTION

Sound is a very important phenomenon to you. Try to communicate with someone in your classroom without talking. Try to talk to someone who does not understand your language. You may be able to hear sounds but not be able to understand their meaning. But when a car horn blows, you know to look out for the car. When a dog barks, you are careful that he is not coming after you. These are just two examples of warnings that you get by sound. In this unit you will study how sound is produced, transmitted and received by the ear or a receiver, and how sound can be pleasurable or very uncomfortable. You will look into ways humans use sound or are helped to use it in the fields of allied health.

# OBJECTIVES

1. The student will be able to interpret both destructive and constructive wave phenomenon.
2. The student will be able to explain why sound travels at different speeds in different material.
3. The student will be able to demonstrate that waves carry energy and travel in the rorm of compressional waves.
4. The student will be able to identify the major components of a wave and explain their importance.

# ALLIED HEALTH PROFESSIONS

Sound is what we use to communicate with each other. If we are unable to hear, we need people to help us to learn a new language (sign language), use a hearing aid, or correct what may be wrong. The following are some of the professions that work in this field of medical help.

1. Speech Pathologist
2. Audiologist
3. Special Educator
4. Speech Therapist

# VOCABULARY

Some of the important words you will cover in this unit are listed below. As you study each word in class, write down its definition. You will be tested on these words at the end of this unit so keep your list accurate and up to date.

1. amplitude
2. auditory canal
3. cochlea
4. compressional wave
5. echo
6. frequency
7. fundamental tone
8. larynx
9. pitch
10. rarefaction
11. supersonic
12. transverse wave
13. vibration
14. wavelength

## QUESTIONS

There are many new areas of wave motion and sound that you will study in this unit. The following question will help you to look for the important areas to be covered. As you study the material that you need to answer these questions, write your answer in the space provided. If you have any problem, ask your teacher for help or use your textbook.

1. What is vibration?
2. What is the speed of sound in air? In water? In wood? Are they the same? Why?
3. How can you determine the distance a thunder storm is away from you?
4. What are the parts of a wave?
5. Name two types of waves.
6. What is frequency?
7. What determines the loudness of sound?
8. What is an echo?
9. How do humans make sound?
10. List three ways sound may differ.
11. List the three major sections of the human ear.
12. How do the parts of the ear work so you can hear?

13. How do different instruments produce sound?

14. How is sound recorded and reproduced?

15. What aids are available to help people hear better?

# ACTIVITIES

Cover your ears with your hand. Can you hear anything? Why? In this unit you will study the characteristics of wave motion and sound that enable you to hear. The following list of laboratories are some of the investigations you will do to study wave motion and sound. You will also examine how you hear and who helps you when you have problems.

1. The Nature and Speed of Water Waves
2. Reflection of Waves
3. Refraction of Waves
4. Diffraction of Water Waves
5. Interference Pattern of Water Waves
6. Wave produced by a Tuning Fork
7. Sound in a Vacuum
8. Matter can carry Sound
9. The Human Ear, and How You Hear
10. Speech: How It Is Produced

# UNIT IX

# LIGHT

# INTRODUCTION

Close your eyes and what do you see? Nothing. This is because your eyelids have stopped the light from entering your eyes. Without a source of light we are unable to see most objects because they do not give off light themselves but only reflect light. The print on this paper can be seen only when light reflects from the page. If you wear glasses, your eyes are aided in focusing on the letters. Glasses are specially shaped so that they correct what is wrong with your vision. In this unit you will study the properties of light and how we use it everyday. In medicine we are greatly dependent upon light and vision in all that is done.

# MEDICAL PROFESSIONS

The use of light to help the body is a very small but important field. Not only do we use light to see but also to repair the human body. The following are a few of the fields that use their understanding of light and the human body in their work.

1. Optician

2. Ophthalmology

3. Optometrist

# VOCABULARY

The following words will be covered in this unit. As you cover each word, write down its meaning as it applies to this subject.

1. concave
2. convex
3. cornea
4. fluorescent
5. footcandle
6. illumination
7. image
8. incident ray
9. incandescence
10. iris
11. mirage
12. opaque
13. optical illusion
14. real image
15. reflection

16. refraction

17. retina

18. spectrum

19. translucent

20. transparent

21. virtual image

## QUESTIONS

The following questions will help you to see what are the important facts of this unit. As you cover the material that answers the question, write it down in the space provided.

1. List the properties of light.
2. What is the speed of light in a vacuum? In air? In other materials?
3. What are some sources of light?
4. What is the inverse-square law relating to light?
5. What happens to light when it strikes an object?
6. What effects do lens have on light rays?
7. What effects do mirrors have on light rays?
8. What are optical illusions and mirages?
9. What is a real and virtual image?
10. How is light used by the human body?
11. Who works to help the human body function with light?

# STUDENT ACTIVITIES

How many ways can you think of that you can use light everyday? How does light help you to do work? The answers to these questions and many others about light will be covered in this unit. To help you understand the properties of light you will do the following laboratories and any additional ones your teacher wishes to include. Remember to keep an accurate record of your observations so that you will have all the information at hand from which to draw your conclusions.

1. Intensity of Illumination and Distance form the Source of Light.
2. The Image of an Object in a Plane, Convex and Concave Mirror.
3. The Index of Refraction of Glass.
4. Polarization of Light.
5. How light passes through a Prism.
6. Focal Length of a Convex Lens.
7. Focal Length of a Concave Lens.
8. The Human Eye and How It Works.
9. How do We Correct Eye Problems With Glasses.

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

ALLIED HEALTH FIELD

NINTH GRADE

# Introduction to Allied Health and the Health Care Team

"PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY

Polly A. Fitz

TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER"

Operation TACT
Curriculum
Teachers' Handbook

CE007157

# TEACHER'S GUIDE

## UNIT I

## INTRODUCTION

In this unit you should introduce your course and familiarize the students with the Allied Health supplements they will be working with during the coming year. In all the units you will be "brainstorming" with the students to form definitions of the vacabulary words. This will help you to monitor your students' progress and will enable them to develop definitions they understand. During the brainstorming activity you will try to elicit responses from the students to form the definitions and allow you to judge the scope of their knowledge of science. This will carry you into Activity A which is the study of the Scientific Method.

In Activity A, use four (4) clean beakers filled approximately 3/4 with plain drinking water. Into three of them add some food coloring. Offer all four beakers to students and tell them to drink the contents. Have them record how they determined their decision of whether to drink it or not. Then discuss how scientists use the scientific method to come up with their conclusion.

Activity B is to see how much the students know about the Allied Health Professions. First, ask the students to write down all the jobs they know of in the health fields and those available in a hospital. Record these on the board. Next, have the students look up in the Sunday classified section of their local newspaper all the medically-related jobs they can find. If possible, you should obtain enough copies ahead of time and reuse them in each class. After they have looked up this information, record it on the board so that all the students can copy it down. Discuss the job descriptions in the paper or use the pamphlets available from TACT to look up job descriptions.

Ask these questions: From the list of jobs, which ones are in most demand? What other conclusions can they make from the information?

# TEACHER'S GUIDE

## UNIT II

## WEIGHTS AND MEASURES

Scientific studies and the Health Field depend on an easy and uniform measurement system: the Metric System. In this unit the students will become proficient in the use of the metric system so that in future courses, and as an adult, they will be accustomed to using it. To understand how the metric system works, it is important that the student have a command of the vocabulary. Discuss with them the prefixes and how we build on them to make the metric system. Then, have them read the newspaper article on the conversion to the metric system that they will see in the United States.

Discuss how all of the Allied Health Personnel use the metric system in their jobs. This will help the students to see its importance, not only to scientists but to those entering the medical field.

When you start the activity on the "HAND", read through the procedure with the students before they start. At the end of the laboratory compare the students' results to show the variations in the human body and that there is no set size for any part of the human body. Explain that these variations in size are normal and that all people are not the same in size.

The laboratory on the "Metric System" is to get the students familiar with laboratory equipment and the metric system. You should go over the placement of the decimal point and the multiplication by a factor of 10. Use the Conversion Table to help the students to convert from one system to the other.

# TEACHER'S GUIDE

## UNIT III

## HUMAN BODY

The study of the human body will give the students a chance to understand how the body functions and how its parts operate. They will be expected to learn many of the basic parts and to identify them on charts. Discuss with them the importance of health personnel for the proper functioning of the human body. The jobs mentioned should be covered first so that as you cover a system, you can point out its importance to the job discussed. Short quizzes on each system are suggested rather than a large test.

A guest speaker should be provided for ahead of time with TACT so that the requested people can be contacted. Movies, charts, and overhead transparencies are extremely useful tools to be used in this unit. Remember this is not a health course but a course to introduce the student to the allied health fields. Try to apply everything to a health job so the students can see why it is important to study any of this material.

# TEACHER'S GUIDE

## UNIT IV

## CHEMISTRY

The chemistry unit is designed to introduce the students to basic chemistry and some of the medical personnel that are related to it. Introduce the students to the Allied Health Professions at the beginning of the unit so that you can discuss the importance of chemistry to their jobs throughout the unit. When you have finished this unit, the students will be prepared to discuss, with a guest speaker, the relationship of chemistry and medicine. Arrange with TACT for a speaker in one of the fields mentioned.

You can follow your textbook's approach to chemistry, but the vocabulary list supplement is to point out what we feel are important words for the students to know. As you cover each word in class, have the students develop a definition that they understand and record it in their notes. Short quizzes may be helpful to check the students' understanding of the application of the words. The chart on the elements may be used to point out some of the basic properties of chemicals and an awareness of their existence.

The laboratories supplied to you in the supplement are some that we feel are interesting to the students and give them a meaningful experience in the laboratory. The scientific method should be emphasized and the students should keep accurate records of the labs. Please feel free to change the laboratories to meet your class's needs. Where possible, show the students how medical personnel do similar tasks every day and the importance of following instruction carefully. This is probably when you would want to take the students on a field trip to a laboratory. Plan far enough ahead with TACT so that you can go during this unit. Prepare the students by going over the jobs they will be seeing by using The Hospital People or Horizons Unlimited. For yourself, check Careers in the Health Field. Have a pre- and post-discussion about the trip and evaluate its importance.

# TEACHER'S GUIDE

## UNIT V

## ELECTRICITY AND MAGNETISM

This unit is one of the most interesting for the students because the students will directly see how electricity works in their bodies. Most textbooks will mention something about how electricity works in the body, but few have any way for you to show it. With the help of the TACT staff you can get an EKG or EEG Technician to demonstrate the equipment he uses to detect electrical currents in the human body. These people should be brought in after you have completed the unit so that the students know something about what the technician is talking about.

Introduce this unit and the medically-related jobs so that the students can see where this knowledge can be applied to a job. Make sure that you point out that many of the jobs use Electricity or Magnetism as a foundation for understanding the job's function.

# TEACHER'S GUIDE

## UNIT VI

## HEAT AND ITS EFFECTS

Again in this unit we can show the students the effects of heat or lack of it on their bodies. The supplementary laboratories should be incorporated into your coverage of heat and its effects from your text. You are the best judge as to when these labs can be used so feel free to adapt them to your class. Introduce the Allied Health Professions at the beginning of the unit so the students will be able to see how and why the material in this unit is important to them. Refer to Careers in the Health Field for your reference and other pamphlets from the TACT Office. The Physical Therapist is probably the best speaker to request for this unit because they work constantly with the human body and use heat treatments to help restore adequate function to it. Make arrangements with TACT either for a field trip or a speaker from this field.

# TEACHER'S GUIDE

# UNIT VII

# FLUID DYNAMICS

In this unit it should be emphasized that the human body is made up of some very special fluids. The understanding and use of fluids as diagnostic tools is one of the most important tests that the medical staff has to monitor and aid the human body. Introduce the unit and make clear that the term fluid means liquid and gas. Next, discuss the jobs of the Allied Health Professions listed. Emphasize the importance of the understanding of the laws of fluids. Follow your text for the general information related to what you wish to cover so that the student can see the relevance of the material to the Allied Health Professions. To explain in detail, contact the TACT Office to make arrangements for speakers to help reinforce their role as it applies to fluid dynamics. For instance, when you are studying gas laws, an Inhalation Therapist would be able to show the application of the gas laws to the human body. A hematologist can be of value in illustrating the properties of liquids in the body. By referring to the book Careers in the Health Field you will better understand the jobs of these people and see where they fit into your class.

# TEACHER'S GUIDE

## UNIT VIII

## WAVE MOTION AND SOUND

This unit should emphasize the importance of everyday hearing and speaking. The medical personnel that are indicated at the beginning of the unit are extremely important to a person with a speech or hearing problem. Discuss with the students the role each of these people play in helping them talk or hear. As you go through your text curriculum, cover hearing and speech also. Here again, you should mention the importance of the material being covered and the Allied Health Professions. At any time during the unit we can arrange to have one of the allied health people come into your class and demonstrate their job and discuss it with your students.

# TEACHER'S GUIDE

## UNIT IX

## LIGHT

The study of light is a small but important unit in General Science. The work of the medical profession in this field is very interesting but complex. Several students in your class may wear glasses and be familiar with the optical field. Start the unit by discussing with the students the reason for wearing glasses and who they saw about them. Go over the role each of the mentioned professions does. Have the students try to think of other professionals they may have met and discuss their role in the medical profession. Your textbook will probably cover the operation of the eye and its problems so we will leave it up to you to follow it.

The vocabulary list is included for you to use as a guide to cover what we feel are important aspects of the study of light. Brainstorm with your students definitions that they are able to understand for each of the words. Read over the Question with the students so they will be aware of the need to answer each question as they are covered in your unit. The Student Activities are suggested laboratories that usually accompany most texts. Discuss each lab with your students so that they know the importance of doing the lab and how it applies to the Allied Health Professions previously discussed.

# ALLIED HEALTH FIELD

## 9TH GRADE CURRICULUM

By: Robert Guyon
Technical Writer

Allen Fisher, Ph.D.
Curriculum Specialist

## TABLE OF CONTENTS

I Introduction

II Objectives

III Resources

  A. Supplied by TACT

  B. Teacher Must Contact

IV Outline of Course

V Teacher's Guide

VI TACT Supplements to Units

# INTRODUCTION

This course is part of a sequence of curriculum to familiarize the student with the application of scientific information to the allied health professions. The ninth grade component is designed to be incorporated into your present program, not a substitute for it. At this level the human body is used only as a mode of interest for the student. The teacher is not expected to go into any great amount of anatomy or physiology. We include a general survey of the systems so that the student is at least exposed to them. This allows the teacher to use the body as a transition from general science principles to the allied health professions.

It is felt that a student should have a good working knowledge of the metric system because in all medically related fields a student will be working with it. In all subjects covered in the general science course the students should be made to use the metric system so that it becomes second nature to them. Since the United States is planning to convert to the metric system the student should learn how to work with it now.

The application of the metric system can be shown in the chemistry unit where we are stressing a working knowledge of chemistry not an in-depth study of it. This will allow the student to comprehend simple chemical theory as it relates to everyday life, the human body and the allied health professions. All other subject areas should follow the same general approach of giving the student a working knowledge of the material, then its application to both everyday life and the allied health fields.

If the teacher plans his schedule far enough ahead, the Counseling Specialist at TACT will be able to arrange for resource persons to come into the class at the end of any unit to help reinforce the study of health careers.

It is important that any modification or changes that you can add to strengthen the program be added as you see fit.

# OBJECTIVES

1. To train the student to collect, summarize and interpret information so that he may make logical conclusions as is necessary in all fields of work.

2. To design a curriculum relevant to present and projected manpower needs in the allied health field. In order to meet this goal, a flexible curriculum had to be developed which would be adaptable in terms of occupations pertinent to the manpower needs of any local community. This could be accomplished by presenting a large number of occupations and related tasks. Individual instructors can then select areas to stress on the basis of local needs.

3. To provide an individualized curriculum that insures successful learning for all students. If this curriculum is properly designed, no student should experience failure; each student should have the opportunity to achieve success in his areas of competency and should be given the opportunity to acquire additional areas of competence. The design of such a curriculum necessitates including a large number of student activities requiring all kinds of skills - not merely the traditional reading and writing.

4. To employ innovative teaching techniques to motivate and interest the students. A variety of student activities would be designed which involve different types of skills. Student observation and performance of tasks done by allied health workers, and field trips as well as work experiences, would be essential elements of this curriculum.

## SUGGESTED VISITORS

Speakers will be made available to you in the following areas if you notify us at least one month ahead of time. Some of these people have films and material that must be arranged for. Their role in your curriculum can be worked out with the TACT coordinator so that their materials will be relevant to your approach.

| | | |
|---|---|---|
| Unit 2 | Metric System | Pharmacist |
| Unit 3 | Human Body | Dietitian; Physical Therapist |
| Unit 4 | Chemistry | Medical Laboratory Technician |
| Unit 5 | Electricity and Magnetism | EKG and EEG Technician |
| Unit 6 | Heat | Physical Therapist |
| Unit 7 | Fluid Dynamics | Inhalation Therapist<br>Cytotechnologist<br>I.V. Nurse<br>American Red Cross - Blood |
| Unit 8 | Wave Motion and Sound | Audiologist |
| Unit 9 | Light | Optician |

# III OUTLINE

## UNIT I. INTRODUCTION

A. Science

1. What is it
2. Branches of Science

B. Scientific Method

1. What is it
2. How do scientists use it
3. How do students use it.

C. Scientific Equipment

Introduce general equipment used for scientific work.

D. Allied Health

1. What is it
2. Who can enter the field
3. Basic job opportunities

## UNIT II. WEIGHTS AND MEASURES

A. Establishing a Measuring System

Early History of Measurement

B. English System - Variable Relationship

1) Distance
2) Weight
3) Volume

C. Metric System - Systematic Relationship

1) Distance

        2) Weight
        3) Volume
    - D. The Metric System in Scientific Work
    - E. The Metric System in Allied Health

## UNIT III. THE HUMAN BODY

- A. Living Matter
    - 1) Cell theory and structure
    - 2) Tissue
    - 3) Organs
    - 4) Systems
- B. Body Systems
- C. General Organization of the Human Body

## UNIT IV. CHEMISTRY

- A. Chemistry and Allied Health
- B. Fundamental Concepts
    - 1) Atom
        - a. proton
        - b. neutron
        - c. electron
    - 2) Elements
        - a. symbols
        - b. Periodic Chart
    - 3) Mixtures and Compounds
        - a. formulas
        - b. equations

C. Matter - Theory
    1. Definition
    2. States of Matter
        a. Solid - Properties of
        b. Liquid - " "
        c. Gas - " "

D. pH Scale
    1. Acids
    2. Bases
    3. Salts

E. Chemical Reactions

    Simple balancing of equations

F. Atomic Energy
    1. Radioactivity
    2. Fission and Fusion
    3. Uses
        a. Industry
        b. Medicine
            1. X-ray
            2. Therapy

G. Chemistry of Foods
    1. Proteins
    2. Fats
    3. Carbohydrates
    4. Tests for each

H. Nutrition of Foods

  1. Human Body Needs

## UNIT V. ELECTRICITY AND MAGNETISM

A. Electricity - What is it

  1. Positive and Negative charge

  2. Flow of current

    a) A.C.

    b) D.C.

  3. Measuring electricity

    a) ampere

    b) watts

    c) volts

  4. Generators

  5. Transformers

B. Circuits

  1. Parallel

  2. Series

C. Resistance

  Measure of in ohms

D. Storage of Electricity

  1. Batteries

    a) Dry cells

    b) Solar

    c) Lead - acid

    d) Others

- E. Electrochemistry
    - 1. Voltaic cell
    - 2. Electroplating
- F. Magnetism
    - 1. History
    - 2. Polarity
    - 3. Fields
    - 4. Electromagnets
    - 5. Permanent Magnets
- G. Electrical Instruments
- H. Human Body and Electricity
    - 1. Nervous System and Muscular System
    - 2. Electricity of the human body
        - a) EKG
        - b) EEG

## VI. HEAT AND ITS EFFECTS

- A. Heat Energy
    - 1. Sources of Heat
    - 2. Production of Heat
        - a) Chemical
        - b) Friction
- B. Measurement of Heat
    - 1. Scales
        - a) Kelvin
        - b) Centigrade
        - c) Fahrenheit

    2. Units of Heat
        a) Calories
        b) BTU
- C. Heat Phenomenon
    1. Expansion
    2. Contraction
- D. Heat Transfer
    1. Conduction
    2. Convection
    3. Radiation
- E. Heating Systems
    1. House
    2. Human Body
- F. The Importance of Heat in Medicine

## UNIT VII. FLUID DYNAMICS

- A. Pressure
    1. Liquid
    2. Air (atmosphere)
- B. Pascal's Principle
- C. Archimedes Principle
- D. Bernoulli's Principle
- E. Instruments
    1. barometer
    2. hydrometer
    3. sphygmomanometer
- F. Fluid Dynamics and Allied Health

## UNIT VIII. WAVE MOTION AND SOUND

A. Wave Phenomenon

  1. Origin of waves
  2. How the body uses waves

B. Sound and Wave Characteristics

  1. pitch
  2. wave length
  3. amplitude
  4. tone
  5. measurement of
  6. musical instruments
  7. voice

C. Sound Transmission

  1. Speed of sound in matter
  2. Transmission of sound in
    a) gas
    b) liquid
    c) solid
    d) vacuum

D. Hearing

  1. Human ear
  2. Interpretation of sound

## UNIT IX. LIGHT

A. Sources of Light

  1. Natural
  2. Artificial

B. Light, Vision and Allied Health

  1. Human eye
  2. Allied Health Professions

C. Color Spectra
   1. Newton's experiment
   2. The spectrum of sunlight
   3. Electromagnetic waves
   4. Chemical identification by spectra

D. Illumination
   1. Candle power
   2. Measuring illumination

E. Properties of light
   1. Reflection
      a) mirrors
         1) concave
         2) convex
   2. Refraction

F. Light and Lenses
   1. Types of lenses
      a) convex
      b) concave
      c) compound
   2. Magnification
   3. Camera lens and telescopes

## SUGGESTED RESOURCES

1. Careers in the Health Field 4.79

   Essie E. Lee
   Julian Messner
   New York 1972

2. Milliken Transparency Duplicating Books

   1. Human Body (20 transparencies, 20 duplicating pages)
   2. Magnetism and Electricity
   3. Light and Sound Energy
   4. Physical and Chemical Changes
   5. Heat, Light and Sound

3. Pamphlets

   1. The Hospital People, A Report by Blue Cross
   2. Horizons Unlimited

# FILMS

About the Human Body

A Grain of Salt

Army Medical Research

Assignment - Weights and Measures

Atomic Medicine

Atoms in the Hospital

Bridge to Tomorrow

Chemistry of Water

Circuit Boards, Design & Manufacturing

Computer Fluid Dynamics

Conquest of Light

Exploring the Atomic Nucleus

Exploring the Human Nervous System

For Eyes to See

Hospital Ship

House of Science

Human Cell and the Cytotechnologist

Incredible Voyage

Introducing Atoms and Nuclear Energy

Invasion by Oil

Is it Enough

Light in Nature

Medical Care for Adolescents

Medical Electronics

Modern Medicine Looks at the Heart

Mr. Galen Comes to Town

Now you See It

Of Men and Minds

People Helping People

Point Loma

DESCRIPTIONS OF FILMS

About the Human Body (y,29) - Explains the major function of the skeletal, muscular, nervous, respiratory, digestive and circulatory system.

A Grain of Salt (gr,98) - Shows that salt is the only rock eaten by man, but it is more than just a seasoning. Modern processing methods prepare it for a variety of uses in the home, on farms, and in industry. It shows how life, with a grain of salt, is made better and more pleasant in many ways.

Army Medical Research (go,271) - Tells of Army Medical Research. It shows how the research is conducted and the latest advances in preventive medicine.

Assignment - Weights and Measures (gr,88) - Tells the story of how weights and measures supervision affects the average American family. It shows some of the things an inspector does, where his standards come from, and the role of weights and measures from corn to corn flakes, from the dairy cow to the milk bottle, from livestock to the roast of beef.

Atomic Medicine (y,30) - Makes a summary examination of the expanding applications of atomic energy for the diagnosis and treatment of disease today and in the future, with Host-Narrator Walter Cronkite.

Atoms in the Hospital (y,30) - Shows the stationary cobalt source which uses radioactive cobalt to treat various forms of malignancies. This is a rotational therapy unit called the "Cesium Ring" which revolves about the patient, focusing the beam on the diseased area.

Bridge to Tomorrow (y,78) - Tells the story of the need for new drugs and the exhaustive procedures taken to insure their safety. It shows the extensive research and testing done on new drugs before they are made available for use by the general public.

Chemistry of Water (go,443) - Presents the unique properties of water. It presents through live action and animation, the structure and behavior of the water molecule.

Circuit Boards, Design & Manufacturing (gr,133) - Shows that electronic equipment today is more complex, yet smaller and more reliable than it was a few years ago. This, in part, has been made possible through the use of solid state circuitry and Circuit Boards. The film covers the complete process in the design and lay-out of high quality boards. Problems and their solutions are discussed. The complete manufacturing process is shown to the final testing of the boards.

Computer Fluid Dynamics (gr,133) - Demonstrates the power of today's giant electronic computers for solving problems that previously were impractical to undertake. The examples cover a wide range of fluid flow problems.

Conquest of Light (gr,133) - Tells the story of the laser, a device with almost unlimited potential in many areas. Although the film explains basically how a laser works and what it is, it does so in language clearly understandable to a non-technical audience.

Counter Attack (y,79) - Shows how American medicine, including its physicians, researchers and other members of the health team is bringing help and hope to the sick and needy people throughout the world.

Exploring the Atomic Nucleus (go,507) - Shows the concepts of atomic structure, how the atomic nucleus is bombarded with other particles, how particle interactions are detected, and the analysis via bubble chamber photographs.

Exploring the Human Nervous System (y,35) - It is intended to stimulate interest in neurological research among students, civic organizations and other groups. It describes the functioning of the nervous system with live action and animation.

For Eyes to See (gr,136) - A presentation of optical science at work. It touches briefly on optical principles and manufacturing methods, developing the story of eye-sight conservation and the many modern applications of scientific instruments for national defense, research, education, and quality control.

Hospital Ship (y,83) - Tells the story of the hospital ship and its role in treating and caring for Americans and Vietnamese people suffering from disease and injuries resulting from the conflict.

House of Science (go,472) - Shows the development of science and natural philosophy and also dispels many illusions concerning the limitations of the field. Scientific procedure is shown to be a natural process arising out of man's curiosity about the world he lives in, and out of the increasing confidence which understanding brings.

Human Cell and the Cytotechnologist (y,38) - About the human cell and the new scientific career opened up by the increasing use of cell study as a means of cancer detection. It shows the work of a cytotechnologist as she prepares and examines under the microscope slides from cell samplings. Photomicrographs of normal and abnormal slides are included.

Incredible Voyage (go,434) - This film takes the viewer on a trip through the human body, via a motion picture camera attached to an endoscope. Among parts of the body explored are the eye, ear, nose, brain, uvula, bronchial tubes, heart, diaphragm, esophagus, stomach, small intestine, gall bladder, urethral canal and the uterus. The film, for all audiences, is truly an incredible voyage.

Introducing Atoms and Nuclear Energy (go,511) - Gives an explanation of the composition of atoms--protons and electrons; how the nucleus releases the energy of the atom by losing particles; nuclear fission, chain reaction, and the nuclear reactors.

Invasion by Oil (gr,100) - Shows the Liberian tanker OCEAN EAGLE aground and broken in two in San Juan, Puerto Rico, harbor. It portrays the procedure by the Corps of Engineers, U.S. Navy, and U.S. Coast Guard to save the beaches and ecology from 3½ million gallons of oil; the salvage of two million gallons of the cargo of 5½ million gallons of oil; the towing of the severed ship's hull and stern to deep water where they were sunk.

Is It Enough (y,39) - A documentary style dramatization of how medical care at the March of Dimes Birth Defects Center at Seattle saved the lives of three brothers afflicted by a hereditary disease, with treatment never before used on humans.

Light in Nature (go,474) - Presents a vivid account of man's ceaseless efforts to understand the world about him through science.

Medical Care for Adolescents (y,41) - Shows that certain health problems are associated with adolescence: growth problems, acne, obesity and nutritional deficiency, and to make a sound transition to maturity, it is often vital for adolescents to have the full benefit of modern medical care.

Medical Electronics (go,513) - Discusses what the medicine of the future may be like as a result of man's increasing understanding and application of electronics. Preventive medicine is the ultimate aim of medical electronics. By 2001 doctors may widely use electronics to cure, diagnose and prevent disease, and thereby make for a longer and healthier life.

Modern Medicine Looks at the Heart (y,41) - Shows the general public how the knowledge and tools of modern medicine enable us to learn more about the heart and heart diseases and to do more for heart patients. Diagnostic tools are shown in use and the use of instruments in two specific heart operations is demonstrated.

Mr. Galen Comes to Town (y,85) - Tells the story of the U.S. Pharmaceutical industry. Features an ancient Roman physician, projected into a 20th century small town setting, reacting with humor, warmth, and incredulity to the wonders of today's medicines.

Now You See It (go,515) - Shows the long-range possibilities of current technological trends that will shape, as a result of new discoveries in optics, the technology of photography, lasers, fiberoptics, microoptics and thermography.

Of Men and Minds (y,86) - Shows that out of the minds of men--not from microscope or test tubes--come the "seed" ideas which grow into scientific discoveries. This film shows the philosophy behind the American Heart Association's research program: investment primarily in the individual scientist.

People Helping People (y,87) - Depicts the modern facilities of well-built, well-managed and well-equipped nursing homes.

Point Loma (go,484) - Depicts various phases of the hydraulic model study of Point Loma, California. It shows the effects of wave action of a model ship, floating causeway, breakwater, small craft landing area, and sewer outfall pier. Both normal and extreme wave conditions are shown.

Prescription for Tomorrow (y,88) - Portrays the overall operations of an ethical pharmaceutical manufacturing company.

Story of Doctor Lister, The (y,90) - Shows Dr. Lister's discovery of an antiseptic to prevent infection and depicts his contributions to surgery.

Story of the Modern Storage Battery, The (gr,149) - Shows the processes used in the manufacture of a modern storage battery, including the making of the grids, insulators, testing, sealing, filling, and packing the modern storage batteries.

Toward the Victory of Health (go,300) - Tells the history of nutrition and important dietary discoveries from the stone age through Hippocrates. The discovery of the vitamin and the study of food components as related to general health are shown.

Triad of Infection - Laity (go,301) - Depicts the interrelationships of host, bacteria, and antibiotic by following the progression of events in a hypothetical infection. The film ends by demonstrating how three different types of antibiotics inhibit or destroy bacteria which causes infection.

Understanding the Atom: Radioisotope Applications in Medicine (y,92) - Presents John Cooper (Dr.) of Northwestern University who discusses the areas of medical research diagnosis and therapy.

Unseen Enemies (go,301) - Shows how medical science wages war against infectious disease and the efforts of dedicated individuals, organizations, and governments to combat and solve this international problem. The film should be previewed before being shown to elementary or junior high school students, because it is very frank and has pictures of diseases and their unpleasant effects.

World Behind Your Light Switch (gr,154) - Shows that Bonneville Power Administration crews work 'round the clock in every kind of weather--on the ground, in the air and beneath the sea--to deliver power when you flick your light switch.

DESCRIPTIONS OF FILMSTRIPS AND PRINTED MATERIAL

Basic Hydraulic Principles (gr,177) - Gives information on the principles of fluid power. It is designed for those persons whose knowledge and understanding of hydraulic equipment and its mode of operation and scientific principles involved are limited.

Anatomy of The Human Ear (gr,221) - This illustration of a schematic of the human ear. Each part is clearly labeled.

Bacteria, The Littlest Cells (gr,222) - Tells about Bacteria--both the "good guys" and the "bad guys".

Bulletin 8A--Conversion Chart (gr,222) - The tables of weights and measures and mass, length, and capacity as well as conversion factors to assist in study.

| TITLE OF FILM | SUPPLIER |
|---|---|
| About the Human Body | AMERICAN HEART ASSOCIATION<br>44 East 23rd Street<br>New York, N.Y., 10010 |
| A Grain of Salt | MODERN TALKING PICTURE SERVICE<br>230 Boylston Street<br>Chestnut Hill<br>Boston, Mass. 02167 |
| Army Medical Research | DEPARTMENT OF THE ARMY<br>Audio-Visual Support Center<br>Fort George G. Mead<br>Maryland 20755 |
| Assignment - Weights and Measures | NATIONAL BUREAU OF STANDARDS<br>Office of Technical Information and Publications<br>Washington, D.C. 20234 |
| Atomic Medicine | UNITED STATES ATOMIC ENERGY COMMISSION<br>New York Operations Office<br>Public Information Service<br>376 Hudson Street<br>New York, N.Y. 10014 |
| Atoms in the Hospital | SAME AS ABOVE (Atomic Medicine) |
| Bridge to Tomorrow | MODERN TALKING PICTURE SERVICE<br>230 Boylston Street<br>Chestnut Hill<br>Boston, Mass. 02167 |
| Chemistry of Water | ALLIED CHEMICAL CORPORATION<br>Mrs. Mona Bannerji, Coordinator<br>Public Information<br>P.O. Box 2245 R<br>Morristown, New Jersey 07960 |
| Circuit Boards, Design & Manufacturing | TEKTRONIX, INC.<br>Film Library<br>Delivery Station 76-580<br>P.O. Box 500<br>Beaverton, Oregon 97005 |
| Computer Fluid Dynamics | UNITED STATES ATOMIC ENERGY COMMISSION<br>New York Operations Office<br>Public Information Service<br>376 Hudson Street<br>New York, N.Y. 10014 |

| TITLE OF FILM | SUPPLIER |
|---|---|
| Conquest of Light | BELL SYSTEM TELEPHONE OFFICES<br>Local Bell System Telephone Business Office |
| Exploring the Atomic Nucleus | UNITED STATES ATOMIC ENERGY COMMISSION<br>New York Operations Office<br>Public Information Service<br>376 Hudson St.<br>New York, N.Y. 10014 |
| Exploring the Human Nervous System | EPILEPSY FOUNDATION OF AMERICA<br>Information and Education Dept.<br>1828 L Street, N.W. Suite 406<br>Washington, D.C. 20036 |
| For Eyes to See | BAUSCH AND LOMB INCORPORATED<br>Film Distribution Service<br>635 St. Paul Street<br>Rochester, New York 14602 |
| Hospital Ship | DEPARTMENT OF THE ARMY<br>Third Naval District<br>90 Church St.<br>New York, N.Y. 10007 |
| House of Science | INTERNATIONAL BUSINESS MACHINES CORPORATION<br>Modern Talking Picture Service<br>IBM Service Desk<br>1212 Avenue of the Americas<br>New York, N.Y. 10036 |
| Human Cell and the Cytotechnologist | AMERICAN CANCER SOCIETY<br>219 East 42nd Street<br>New York, N.Y. 10017 |
| Incredible Voyage | MODERN TALKING PICTURE SERVICE<br>230 Boylston St.<br>Chestnut Hill<br>Boston, Mass. 02167 |
| Introducing Atoms and Nuclear Energy | UNITED STATES ATOMIC ENERGY COMMISSION<br>New York Operations Office<br>Public Information Service<br>376 Hudson Street<br>New York, N.Y. 10014 |

| TITLE OF FILM | SUPPLIER |
|---|---|
| Invasion by Oil | U.S. ARMY ENGINEER DISTRICT<br>Attention PAO<br>P.O. Box 4970<br>Jacksonville, Florida 32201 |
| Is It Enough | THE NATIONAL FOUNDATION--<br>MARCH OF DIMES<br>Division of Public Education<br>Box 2000<br>White Plains, New York 10602 |
| Light in Nature | SHELL FILM LIBRARY<br>450 N. Meridian Street<br>Indianapolis, Indiana 46204 |
| Medical Care for Adolescents | MERCK SHARP & DOMHME FILM LIBRARY<br>West Point<br>Pennsylvania 19486 |
| Medical Electronics | MODERN TALKING PICTURE SERVICE<br>230 Boylston St.<br>Chestnut Hill<br>Boston, Mass. 02167 |
| Modern Medicine Looks at the Heart | AMERICAN HEART ASSOCIATION<br>44 East 23rd Street<br>New York, N.Y. 10010 |
| Mr. Galen Comes to Town | MODERN TALKING PICTURE SERVICE<br>230 Boylston Street<br>Chestnut Hill<br>Boston, Mass. 02167 |
| Now You See It | MODERN TALKING PICTURE SERVICE<br>(Same as above) |
| Of Men and Minds | AMERICAN HEART ASSOCIATION<br>44 East 23rd Street<br>New York, N.Y. 10010 |
| People Helping People | UNITED STATES DEPARTMENT OF<br>HOUSING AND URBAN DEVELOPMENT<br>Obtain from:<br>MODERN TALKING PICTURE SERVICE<br>(address above) |
| Point Loma | U.S. ARMY ENGINEER WATERWAYS<br>EXPERIMENT STATION<br>Attention: WESTR<br>P.O. Box 631<br>Vicksburg, Mississippi |

| TITLE OF FILM | SUPPLIER |
|---|---|
| Prescription for Tomorrow | ROBINS COMPANY, A.H.<br>Mr. Robert J. Grey, Manager<br>Community Relations Services<br>1407 Cummings Drive<br>Richmond, Virginia 23220 |
| Story of Dr. Lister, The | MODERN TALKING PICTURE SERVICE<br>(See address above) |
| Story of the Modern Storage Battery, The | ASSOCIATION-STERLING FILMS<br>484 King Street<br>Littleton, Massachusetts 01460 |
| Toward the Victory of Health | MODERN TALKING PICTURE SERVICE<br>(See address above) |
| Triad of Infection-Laity | LILLY AND COMPANY, ELI<br>Miss A. I. Proctor<br>Audio Visual Film Library<br>P.O. Box 618<br>Indianapolis, Indiana 46206 |
| Understanding the Atom: Radioisotopes Applications in Medicine | UNITED STATES ATOMIC ENERGY COMMISSION<br>New York Operations Office<br>Public Information Service<br>376 Hudson Street<br>New York, N.Y. 10014 |
| Unseen Enemies | SHELL FILM LIBRARY<br>450 North Meridian St.<br>Indianapolis, Indiana 45204 |
| World Behind Your Light Switch | BONNEVILLE POWER ADMINISTRATION<br>United States Department of the Interior<br>P. O. Box 3621<br>Portland, Oregon 97208 |

| TITLE OF FILMSTRIP | SUPPLIER |
|---|---|
| Basic Hydraulic Principles | OWATONNA TOOL COMPANY<br>Mr. T. L. McEnaney<br>Audio Visual Coordinator<br>Owatonna, Minnesota 55060 |
| Anatomy of the Human Ear (Printed material) | ZENITH HEARING AIDS SALES CORPORATION<br>6501 West Grand Avenue<br>Chicago, Illinois 60635 |

| TITLE OF FILM | SUPPLIER |
|---|---|
| Bacteria, The Littlest Cells<br>(Printed material) | NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES<br>Information Office<br>National Institutes of Health<br>Bethesda, Maryland 20014 |
| Bulletin 8A - Conversion Chart<br>(Printed Material) | CHAUS SCALE CORPORATION<br>29 Hanover Road<br>Florham Park, New Jersey 07932 |

## SUGGESTED LABORATORIES

Laboratory studies are an important part of any science class and should reinforce the principles taught in your class. Since there are many good laboratory manuals available, or your textbook may have its own, we are including a list of suggested laboratories we feel should be included in your course of study. It is important that the student learn to collect data, apply it to a situation, and draw a conclusion. This procedure will train the student to develop a good scientific procedure that can be applied to everyday life and the medical professions.

Unit II. Metric System

1. Measuring Length.
2. Measuring Volume.
3. Measuring Weight.
4. Measuring Density.
5. Measuring Specific Gravity of Solids and Liquids.

Unit IV. Chemistry

1. Properties of Solids, Liquids, and Gases.
2. What is a Mixture?
3. What is a Compound?
4. Is Water a Compound or Mixture?
5. Identifying Chemicals by the Flame Test.
6. Can Solutions Conduct Electricity?
7. Properties of Acids, Bases, and Salts.
8. What is pH?
9. Testing Everyday Substances You Find If They Are Acids, Bases, or Salts.
10. Testing for Food Substances: Proteins, Fats, and Carbohydrates.

11. Exothermic and Endothermic Reactions.
12. Metals and Nonmetals.
13. Prove that Matter is neither created nor destroyed in a chemical reaction.
14. Properties of Oxygen.
15. Properties of Carbon Dioxide.
16. Properties of Hydrogen.

Unit V. Separating Mixtures and Compounds.

A. Electricity
1. Wiring Electric Circuits
2. Static Electricity - The Electroscope.
3. Electroplating.
4. Electric Bell.
5. Ohm's Law.
6. Series and Parallel Circuits.

B. Magnetism
1. Theory of Magnetism.
2. Magnetic Fields.
3. Electric Currents and Magnetic Fields.
4. Electromagnetics.

Unit VI. Heat Energy
1. Checking the Fixed Points of a Thermometer.
2. Evaporation.
3. Dew Point and Relative Humidity.

Unit VIII. Wave Motion and Sound
1. Wavelength and Velocity of Sound.
2. Sound Transmission in Different Media.
3. The Study of Wave Motion in a Wripple Tank

Unit IX. Light

1. Laws of Reflection.
2. Laws of Refraction.
3. Index of Refraction.
4. Plain and Curved Mirrors.
5. Convex and Concave Lenses.
6. The Spectroscope.